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Automobile Exhaust Emission Surveillance Analysis of the FY 1974 Program

Dayton Univ, Ohio Research Inst

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AUTOMOBILE EXHAUST EMISSION SURVEILLANCE ANALYSIS OF THE FY 1974 PROGRAM

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U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air and Waste Management
Office of Mobile Source Air Pollution Control
Emission Control Technology Division
Ann Arbor, Michigan 48105

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The Emission Factor Program provides a realistic assessment of the effectiveness of Federal regulations by testing production vehicles in the hands of the motoring public. This report summarizes the results of the FY 74 Emission Factor Program and compares these results with those obtained in the FY 71, FY 72 and FY 73 Emissions Factor Programs. The FY 74 Program tested a sample of 1965-1973 model year vehicles in seven cities.

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AUTOMOBILE EXHAUST EMISSION SURVEILLANCE ANALYSIS OF THE FY 1974 PROGRAM

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ABSTRACT

The Environmental Protection Agency has recognized that a realistic assessment of the effectiveness of Federal air pollution regulations requires the measurement of emissions from production vehicles in the hands of the motoring public. Accordingly, the Emission Factor Program has been developed to obtain this needed information by testing fleets of consumer-owned vehicles in major cities.

This report summarizes the results of the FY74 Emission Factor Program and compares these results with those obtained in the FY71, FY72, and FY73 Emission Factor Programs. HC, CO and NOX emissions are summarized in terms of both arithmetic and geometric means and standard deviations and fuel economy is summarized in terms of harmonic means and standard deviations. Summaries are presented for each city and model year combination, for each manufacturer for 1975 model year vehicles and for the results of highway fuel economy tests, low and high speed transient cycle tests and for loaded vehicle tests.

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1. SUMMARY, CONCLUSIONS, AND BACKGROUND

The EPA Emission Factor Program (EFP) is a continuing effort which characterizes the emissions of light duty vehicles in their in-use condition. This report summarizes the data from the fourth year (FY 74) in the series and updates the sample to include 1975 model year vehicles as well as provides continued monitoring of previous model years. State and local agencies, Federal air pollution officials, automobile manufacturers, and concerned citizens can use this summary to estimate the impact of light duty vehicle emissions on air quality and to determine conformity of vehicles to the standards under which they were certified.

The data summarized in this report were generated from a random sample of in-use vehicles in seven cities: Chicago, Denver, Houston, Los Angeles, Phoenix, Ft. Louis, and Washington D.C. Exhaust emission tests were performed on each vehicle in accordance with the 1975 Federal Test Procedure (FTP) which consists of a transient driving cycle with an average speed of 19.6 mph. The 1975 FTP exhaust emission test procedure is comprised of three phases:

(1) a cold transient phase representative of vehicle start-up after a long engine-off period;

(2) a stabilized phase representative of engine operation after the normal operating temperature has been achieved; and

(3) a hot transient phase representative of vehicle operation immediately after a relatively short engine-off period.

The emission test results of the three phases of the 1975 FTP are weighted 40%, 53%, and 17% , respectively, before they are combined. The 1972 FTP emission test results can be calculated by combining the first two phases of the test (weighted equally). The tests were conducted by three contractors and more detailed information on specific tests or results can be found in the reports of the contractors, References (1), (2), and (3).

When possible, comparisons are made between the results of the FY74 Program with those of previous years, References (4), (5), and (6). Such comparisons are made on the basis of the 1975 FTP since 1975 model year vehicles were emphasized in this year's program. However, FY74 summary results are also presented for the 1972 FTP to facilitate comparison if these weighting factors are preferred.

1.1 SUMMARY

The FY74 Emission Factor Program consisted of exhaust emission tests on 1965 through 1975 model year in-use vehicles and light duty trucks (LDT) under 6,000 lbs gross weight. Tests of hydrocarbon (HC), carbon monoxide (CO), oxides of nitrogen (NoX), and carbon dioxide (CO_2) emissions were performed in each of seven cities. The test locations were selected to represent heavily populated areas of diverse meteorological, geographical, and usage environments. The northeast sector and northern Great Plains with long winters are represented by Chicago. The Great Plains region having moderate winters is represented by St. Louis while that of a very warm, humid climate is represented by Houston. Mountainous metropolitan areas are represented by Denver. Los Angeles represents the temperate, warm western region and Washington D.C. is typical of cities on the eastern seaboard. For the first time in the Emission Factor Programs, the desert areas are represented by the inclusion of Phoenix in the group of surveyed cities.

The vehicles tested in each city were selected to be a nationally representative (random) sample of cars within a model year but the number of vehicles for each model year are not representative of the total population of in-use vehicles. A sufficient sample of 1975 model year vehicles were tested so that average emissions for each manufacturer could be used to generate composite emission levels on the basis of a weighting by manufacturers. Therefore, in using the data, comparisons must be made on a model year basis. The number of vehicles tested in each model year for each city are as follows:

MODEL YEAR

	75	75 LDT	74	73	72	71	70	69	68	67-65
Chicago	168	10	94	94	94	45	40	35	30	60
Denver	35	10	30	27	25	**	**	**	**	**
Houston	117	10	30	**	25	**	**	**	**	**
Los Angeles	35	10	30	27	25	**	**	**	**	**
Phoenix	117	10	30	27	25	45	19	18	17	35
St. Louis	190	10	60	60	60	45	40	35	30	60
Washington	35	10	30	**	25	**	**	**	**	**

A summary of the FY 1974 Emission Factor Program results for 1975 model vehicles is presented in Table 1. The most noteworthy differences displayed in this table indicate that emission rates in Denver and Los Angeles are significantly different from those of the other cities. Los Angeles had significantly lower HC and CO emissions than the other cities while Denver had significantly greater HC and CO and significantly lower NOX emissions than the other cities. For this reason composite tables have been prepared combining all cities except Los Angeles and Denver. The composite emissions from all test cities except Los Angeles and Denver are believed to be the best single estimates representative of all the remaining sections of the country (i.e., non-California low altitude areas).

More stringent Federal standards went into effect for the 1975 model year vehicles. The influence of these standards on the emission levels can be realized by comparing the average emissions for each model year in its first year of operation. Table 2 presents such arithmetic average emissions for the composites of all cities except Denver and Los Angeles, for Denver, and for Los Angeles. It is noteworthy that average 1975 model year HC and CO emissions are significantly less than those of previous years for the composite, for Denver, and for Los Angeles. Average NOX levels are not significantly reduced from those of the 1974 model year vehicles but are significantly less than those of pre-1974 model years. The HC and CO

TABLE I

CY 74 EMISSION FACTOR PROGRAM

SUMMARY TABLE OF EMISSION LEVELS USING

THE 1975 FTP FOR 1975 MODEL YEAR AUTOMOBILES

City	Number of Vehicles Tested	Miles Miles (Thousands)	Hydrocarbons GMS/MI Arithmetic		Carbon Monoxide GMS/MI Arithmetic		NOX GMS/MI Arithmetic		Fuel Economy MI/GAL Harmonic		Mile Hydrocarbons Tests per Million Tests		Mile Carbon Monoxide Tests per Million Tests	
			Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Chicago	197	6.1	1.27	1.05	22.55	19.15	2.43	0.87	11.68	1.02	117	139	1.46	2.27
Houston	117	9.6	1.49	1.29	27.11	31.81	2.59	1.18	11.35	1.35	98	117	1.48	2.89
Phoenix	117	10.2	1.39	0.89	21.66	21.35	2.35	0.95	14.87	1.52	98	89	1.29	1.96
St. Louis	150	9.5	1.25	1.12	20.88	23.19	2.28	0.97	11.81	1.25	191	259	1.57	2.21
Washington, D.C.	35	11.1	1.25	0.76	16.55	15.17	2.97	1.25	11.52	1.40	117	266	1.07	2.51
5 Cities Averaged	587	8.0	1.32	1.03	22.92	23.56	2.44	1.01	11.51	1.31	139	178	1.48	2.27
Los Angeles	35	8.1	0.52	0.25	6.59	6.87	2.39	1.14	12.75	1.30	33	45	0.14	0.46
Denver	35	13.5	2.22	1.12	48.52	38.46	1.62	0.65	14.45	1.55	139	497	1.61	2.39

TABLE 4

MEAN EMISSIONS AFTER APPROXIMATELY ONE YEAR OF OPERATION FROM EMISSION FACTOR PROGRAMS -- 1975 FTP

Location	Average Mileage (Thousands)	HC GM/MI	CO GM/MI	NOX GM/MI
City Composite[1]				
FY71 EFP, 1971 Models	15.6	1.07	39.56	5.06
FY72 EFP, 1972 Models	14.8	1.02	36.88	4.55
FY73 EFP, 1973 Models	18.1	1.59	46.96	3.47
FY74 EFP, 1974 Models	10.3	1.68	41.77	3.89
FY74 EFP, 1975 Models	8.8	1.32	33.92	2.44
Denver				
FY71 EFP, 1971 Models	15.3	5.59	88.13	1.05
FY72 EFP, 1972 Models	14.1	4.75	80.36	1.08
FY73 EFP, 1973 Models	14.3	4.54	84.70	1.96
FY74 EFP, 1974 Models	14.6	5.15	83.67	1.85
FY74 EFP, 1974 Models	13.9	3.33	48.92	1.63
Los Angeles				
FY71 EFP, 1971 Models	15.8	1.04	42.26	1.83
FY72 EFP, 1972 Models	17.6	1.56	46.68	1.81
FY73 EFP, 1973 Models	21.5	1.85	39.39	1.04
FY74 EFP, 1974 Models	22.6	2.57	37.05	2.47
FY74 EFP, 1975 Models	8.1	0.52	6.99	2.38

[1] FY71 and FY72 -- Chicago, Houston, St. Louis, Washington, D.C.
FY73 -- Detroit, Houston, St. Louis, Newark
FY74 -- Chicago, Houston, Phoenix, St. Louis, Washington D.C.

reductions are probably attributable to the manufacturers conversion to catalytic converters and other improvements in emission controls but it should be noted that the average mileage for the 1975 vehicles at the time of their tests was considerably less than that of the other model years.

The Federal 49 State Standards and 1975 California Standards for emissions in grams per mile based on constant volume sampling are summarized as follows:

		HC	CO	NOX
Federal 49 State	1973 (1972 FTP)	3.4	39.0	--
	1973/1974 (1972 FTP)	3.4	39.0	3.0
	1975 (1975 FTP)	1.5	15.0	3.1
	1975 Trucks (1975 FTP)	2.0	20.0	3.1
California	1975 (1975 FTP)	0.9	9.0	2.0
	1975 Trucks (1975 FTP)	2.0	20.0	2.0

The 1975 standards are expressed in terms of the 1975 FTP. A conversion between the 1972 FTP and the 1975 FTP depends upon vehicle mix approximately equivalent values for the 1972-1974 model year vehicles are:

	HC	CO	NOX
1972 FTP	3.4	39	3.0
1975 FTP	3.0	34	3.1

The 1975 Federal 49 State Standards for HC and CO are considerably more stringent than those of previous years while the NOX standard has not been reduced. It is of interest to note that although average HC and CO emissions have been significantly reduced in the 1975 models, the composite arithmetic average for CO is still greater than the standard and the composite HC and NOX averages are less than the standard. Average NOX emissions in Denver for 1975 model year vehicles are less than the standard but average HC and CO emissions exceed the standard in this city. The Los Angeles average emissions are less than the Federal 49 State Standards but exceed

the California Standards for NOX.

In addition to the basic tests of the Emission Factor Program, highway fuel economy tests, high and low speed transient cycle tests and loaded vehicle tests were conducted during the FY 74 Program. (See Sections 3.3.7 through 3.3.10 for test descriptions.) The data from these tests are also summarized in this report. Each vehicle owner also completed a questionnaire concerning usage, maintenance and repair of his vehicle. An attempt was made to identify relationships between responses and emission rates but for most of the questions no consistent trends were identified.

1.2 CONCLUSIONS

Results of the FY 74 Emission Factor Program summarized in this report reveal that:

1. Individual vehicles of any stratification show wide dispersion in exhaust emissions. The coefficient of variation (standard deviation divided by the average) is typically greater than 50% and quite often is greater than 100%. Consequently, two groups of vehicles, for example populations of vehicles tested in two different cities, may show considerable overlap of their statistical distributions even though the mean emissions for the two groups are appreciably different. Generalizations with regard to make, city or other categories of interest, therefore, are often not applicable to comparison of individual vehicles or small subsets of vehicles drawn from the two categories.

2. The comparison of the average emission differences between cities resulted in the conclusion that emissions from Denver and Los Angeles vehicles are significantly different from those of all other cities. Average HC and CO emissions in Denver are

significantly greater than those of the other cities while average NOX emissions are significantly less. These Denver differences have been observed in past programs and have been attributed to the effect of altitude on air-fuel ratios. Los Angeles vehicles had significantly less HC and CO emissions than all other cities. Some individual differences between cities for particular model years were significant but such differences were not consistent for all model years. There was a tendency for Houston to have higher HC and CO emissions. Note in Tables 9-12 that the model year by city stratification has relatively small sample sizes for all model years except 1975.

3. The percentage of 1975 model year vehicles meeting the 1975 Federal Standards are presented in Table 3.

TABLE 3

PERCENT OF 1975 MODEL YEAR VEHICLES
MEETING 1975 FEDERAL 49 STATE STANDARDS--1975 FTP

Pollutant	Five City Composite (587 Vehicles)			Denver (35 Vehicles)			Los Angeles (35 Vehicles)		
HC	70%	or	411	23%	or	8	100%	or	35
CO	51%	or	300	6%	or	2	91%	or	32
NOX	79%	or	465	97%	or	34	80%	or	28
All three	37%	or	215	6%	or	2	74%	or	26

4. The downward trend in HC, CO, and NOX from pre-1968 vehicles (pre-control in all cities except Los Angeles) that had been noted in previous Emission Factor Programs is continued with the addition of the 1975 model year vehicles. Table 4 presents the 1965-1967, 1974 and 1975 model year arithmetic averages and the percent reduction. Note that the 1975 model year vehicles had significant reductions in all three pollutants in the composite of all cities except Denver and Los Angeles. Note again, however, that the 1975 model year vehicles had accumulated much less mileage than the other model years.

5. Comparison of the results of the FY71, FY72, FY73, and FY74 Emission Factor Programs verified the general trend for HC and CO average emissions to increase with the age of the vehicle.

6. The only definite relationships between average emissions and the responses to the questionnaire that were identified, relate to 1975 model year vehicles on the questions concerning presence of hydrogen sulfide odor and the use of unleaded fuel. The 1975 model vehicles for which owners regularly detected the hydrogen sulfide odor (8% of the vehicles) had significantly larger average HC, CO, idle HC and idle CO levels and significantly smaller average NOX than those for which the odor was never detected. The regular use of leaded fuel in 1975 vehicles for which unleaded fuel is required produced significantly larger average CO and idle CO emissions and a trend to higher HC emissions but the NOX emissions were not significantly changed. However, follow up questioning of a sample of the participants regarding the use of leaded fuel in 1975 vehicles indicated that this question may have been misunderstood.

TABLE 4

COMPARISON OF FY74 EPP MEAN EMISSION LEVELS OF 1975 MODEL YEAR VEHICLES WITH 1965-1967 AND 1974 MODEL YEARS--1975 FTP

	HC GM/MI	CO GM/MI	NOX GM/MI	Mean Miles (K)	N
Five City Composite					
1965-1967	8.93	108.54	3.89	80.8	126
1974	2.58	41.77	4.89	40.2	193
1975	1.32	22.92	3.44	8.8	587
Percent Reduction					
65-67 vs 74	60*	62*	0		
65-67 vs 75	85*	79*	15*		
74 vs 75	64*	48*	16*		
Denver					
1974	5.15	83.7	1.85	24.5	10
1975	2.22	48.5	1.62	13.8	19
Percent Reduction					
74 vs 75	57*	42*	12		
Los Angeles					
1974	2.57	17.05	3.47	22.6	10
1975	0.52	6.59	2.38	8.1	15
Percent Reduction					
74 vs 75	80*	82*	1		

*Significant at 95% level.

7. The Low and High Speed Transient Cycle Tests indicate that the low speed cycle (average speed 11.8 mph) produces significantly more HC and CO and significantly less NOX emissions than the high speed cycle (average speed 35.0 mph). Fuel economy is significantly greater in the high speed cycle than in the low speed cycle.

8. Results of the loaded vehicle tests were in agreement with those noted in the FY73 Emission Factor Program. Adding 1000 lbs to simulate the towing of a trailer significantly decreases fuel economy and significantly increases emission levels. Although adding 500 lbs also increases emissions and decreases fuel economy, the change is not as severe.

1.3 BACKGROUND

The Congress, through the enactment of the Clean Air Act of 1963 and amendments thereto, provided for a national air pollution program to monitor and control emissions from new motor vehicles. Administrative responsibility for the air pollution control program is vested with the U.S. Environmental Protection Agency (EPA).

The first nationwide standards for exhaust emissions, together with the testing and certification procedures, were issued in 1966 and were applicable to 1968 model year passenger vehicles and light-duty trucks under 6000 lbs sold within the United States. Levels for maximum allowable exhaust emissions were imposed initially on HC and CO pollutants only. Hydrocarbons were restricted to 275 parts per million concentration and carbon monoxide was restricted to 1.5 percent. These pollutants were measured using the 7-mode cold-start test procedure.

More stringent standards on a mass equivalent basis were introduced for 1970 and 1971 model year vehicles. The Federal standards based on the 7-mode procedure, expressed in mass equivalents, were 2.2 grams/mile for HC and 23 grams/mile for CO. In 1972, a change was made to a new test

procedure. This procedure involved a new sampling method, the Constant Volume Sampling Procedure (CVS), and a new driving sequence. At that time the standards were again strengthened. HC was restricted to 3.4 grams/mile and CO was restricted to 39.0 grams/mile. The numerical increase in the standards from 1971 to 1972 reflects the increased stringency of the testing procedures. In terms of the 1972 test procedure, the 1971 standards were equivalent to approximately 4.6 grams/mile for HC and 47 grams/mile for CO. The first Federal Standards applicable to oxides of nitrogen were set at 3.0 grams/mile. For 1975 model year vehicles, the standards were again strengthened with the promulgation of tighter standards under the 1975 test procedure. The 1975 test procedure produces lower numerical values than the 1972 test procedure. The 1973-1974 standards (3.4 gm/mi HC, 39 gm/mi CO, 3.0 gm/mi NOX) in 1975 FTP terms would be 3.0 grams/mile for HC, 34 grams /mile for CO and 3.1 grams/mile for NOX. The first Federal evaporative emission standards were introduced for 1971 model-year vehicles.

Under the Clean Air Act, manufacturers are required to submit applications containing data gathered during both phases of a two-part test program in order to qualify for certificates of conformity. The first phase of testing provides data on exhaust emissions which show the performance of the control equipment after the engine has been broken in, but before substantial mileage has been accumulated. These data are known as 4 000 mile emission data. The second phase of the test program provides data on the durability of the emission control system. These data are known as 50 000 mile durability data.

For 1968-1971 model year vehicles, compliance was demonstrated whenever the mean emission level from a specified sample of emission-data prototypes of each engine displacement, weighted according to projected sales volume, was within the applicable standard. This mean incorporates a deterioration factor determined from a sample of durability-data prototypes representative of at least 70% of the manufacturer's engine displacement/transmission options. Inherent in this method of certification is the fact

that mean values for HC or CO near the levels specified in the standard may result in as many as 50% of certified or in-use vehicles being above the standard for either pollutant. (The 50% figure assumes that emissions of prototype vehicles are symmetrically distributed. In the case of lognormality, less than 50% but still an appreciable fraction of the vehicles could be above the standard).

For 1972 and subsequent model year vehicles, every vehicle tested in the certification sample must have emissions below the level of the applicable standard. The certification prototypes are tested with vehicle parameter "settings", e.g. engine timing, at or near the mean of the allowable production range. Therefore, to the extent that emissions vary within the allowable range of parameter settings, some percentage of production vehicles might be expected to emit pollutants above the certified standard. At the present time, no data exist to quantify this percentage.

EPA has recognised that a realistic assessment of the effectiveness of Federal air pollution regulations requires the measurement of emissions from production vehicles in the hands of the motoring public. Accordingly, a series of exhaust emission surveillance programs has been administered by the EPA during the past several years to obtain such definitive information. Test fleets of consumer-owned vehicles within various major cities were selected by make, model, engine size, transmission, and carburetor categories in such proportion as to be representative of the normal production vehicles sold (or projected to be sold) for that model year in the United States.

The principle objective of such surveillance programs is to gather emissions data from a representative sample of in-use motor vehicles. Using the data from the surveillance programs, the appropriate in-use vehicle emission factors are developed for in-use emission source inventories, state transportation control plans, environmental impact statements, and other emission control strategy evaluations. In addition, data are collected which are used to model the effect of automobile emissions under arbitrary traffic and road network conditions in order to evaluate emissions under conditions other than the FTP.

2. EMISSION FACTOR PROGRAM DESIGN

The prime objective of the Emission Factor Program is to provide a valid estimate of the emissions from the population of in-use vehicles. Accordingly, considerable care has been exercised in the conduct of this continuing effort to insure that a representative sample of vehicles would be selected for testing, that the tests would be conducted under identical, rigidly controlled conditions, and that all resulting data were subjected to quality inspections. The FY 74 Emission Factor Program differed from those of previous years only in the selection of the vehicles to be included in the sample, in the performance of additional emission tests and in the completion of an extensive owner questionnaire regarding vehicle usage and maintenance characteristics. The additional tests were performed on a subset of the sample and included Highway Fuel Economy Tests, Low Speed Transient Cycle Tests, High Speed Transient Cycle Tests and Loaded Vehicle Tests.

The following paragraphs describe the FY 74 selection of vehicles and present a brief summary of the vehicle handling procedure. Further details concerning the conduct of the testing can be found in the individual contractor reports, References (1), (2), and (3), and in the report of the FY 73 Emission Factor Program, Reference (5).

The selection of the cities to be sampled in the FY 74 Emission Factor Program were chosen to represent heavily populated areas of diverse geographical and climatological regions as discussed in Section 1. The selection of vehicles within a city were not chosen to provide a random sample of all vehicles within a city. Rather, the sample selected was random for each model year but the number of vehicles for each model year is not representative of the in-use vehicles for the cities. This selection procedure is the major difference between the FY 74 program and that of previous years and was deliberately adopted to provide a large sample of 1975 model year vehicles. Note that with the FY 74 Emission Factor Program sampling

procedure, comparisons with previous programs must be made on a model year basis and cannot be made on a basis of results averaged over several model years.

Within each city and within each model year, the particular selection of the desired number of vehicles was made to provide a random sample based on national vehicle sales by vehicle make, engine size, carburetor type, and transmission type. From an automobile registration list, a sample of vehicles was selected which best fit the required vehicle population profile. The owners of the selected vehicles were then contacted and provided with inducements if their vehicles were used for testing. These included a $50 U.S. Savings Bond, the use of a loan car while their car was being tested, and a full tank of gasoline.

Upon delivery of a test vehicle to the laboratory it was inspected to insure that it could be safely run on the dynamometer. Cars which failed this inspection were rejected. Exhaust emissions were determined by the constant volume sampling technique in accordance with the 1975 Federal Test Procedure. The vehicles were tested in an as received condition so that the resulting emission data would reflect variability in owner usage, maintenance and repair practices. The additional tests which were performed on a subset of the vehicles are described in Section 3 of this report. Upon completion of testing, engine diagnostic procedures were performed which included basic timing, point dwell and idle rpm. See References (1), (2), and (3) for measurements.

5. STATISTICAL ANALYSIS

The thrust of the statistical analysis of the FY 74 Emission Factor Program is to summarize the data in a form that is amenable to estimating the emissions of the model year vehicles and to comparing emission results of various subsamples of the total population. To achieve this objective the primary summarization method adopted is that of presenting the data in terms of sample means and standard deviations for stratifications of the total population of in-use vehicles. For reasons to be discussed in the following paragraphs the emission data are summarized by both arithmetic and geometric means and standard deviations whereas fuel economy is given in terms of harmonic means and standard deviations.

The in-use vehicles for a model year represent a broad spectrum of manufacturers, models, weights, engine size and type, and levels of repair and maintenance. Since all of these factors may have an impact on the measured emissions and fuel economy, the data exhibit considerable variability for any major sub-grouping of the total sample, such as all vehicles within a city. Previous studies on the distribution of the emissions (Reference 5) have indicated that the variability in data can reasonably be described by a lognormal and/or a normal probability distribution with the lognormal distribution being more universally applicable. Further, since the emissions cannot be negative and since standard deviations approximately equal to the mean are quite frequently observed in the data, the distribution of emissions show a strong tendency to be positively skewed. Therefore, for estimating the percentage of individual vehicles below given emission levels (percentiles of the emission distributions), the lognormal distribution provides a reasonable probability model. (A heuristic argument for this statement is given in Reference 4.) The lognormal distribution is completely characterized by the geometric mean and standard deviation which explains the inclusion of these parameters in the data summaries.

On the other hand, comparisons of the impact of emission levels on air quality can be conveniently made in terms of the arithmetic means and standard deviations since the arithmetic mean represents what is being emitted into the air, regardless of distribution shape. Statistical tests of hypotheses regarding equality of arithmetic means can be made given the sample means, sample standard deviations and the sample size. Therefore, arithmetic means and standard deviations are included in the data summaries to provide emission factors and to permit convenient tests for significant differences.

The application of the geometric mean and standard deviation to estimate percentiles of a lognormal distribution may require a brief explanation. If the emissions are considered to have a lognormal distribution then the logarithms of the emissions have a normal distribution. The geometric means and standard deviations are, in actuality, the antilogarithms of the means and standard deviations of the logarithms of the emissions. Thus, working in the units of gms/mi, percentiles of the distribution are obtained by multiplying the geometric mean by the geometric standard deviation raised to the appropriate power. For example, since 84 percent of a normal distribution is less than the mean plus one standard deviation, 84 percent of a lognormal distribution is less than the geometric mean multiplied by the geometric standard deviation to the first power. Similarly, 97.5 percent of a lognormal distribution is less than the geometric mean multiplied by the 1.96 power of the geometric standard deviation. This procedure is entirely equivalent to that of finding the percentiles of the logarithms of the emissions by standard normal distribution methods and then taking antilogarithms to return to the practical engineering units of gms/mi. Further, if the emissions have a lognormal distribution, then the geometric mean is the 50th percentile (median) of the distribution.

As noted earlier, fuel economy data are summarized in terms of harmonic means and standard deviation of the parameter observed miles

per gallon. The average fuel economy for a group of vehicles can be defined as total miles divided by total fuel consumed. It can be shown that since all individual vehicles are driven the same distance in the tests, that average fuel economy in miles per gallon is the harmonic mean of the fuel consumed during the tests of the individual vehicles. See Reference (5) for the derivation of this equivalence and method of statistical inference regarding the fuel economy parameter.

5.1 EMISSION DATA AND RESULTS

The results of the FY 74 Emission Factor Program are summarized in Tables 5 through 80, Appendix I, and Appendix II. The data of Tables 5 through 80 are specifically noted in the following text and are based on the 1975 FTP. In the event that a user would prefer other than FTP weighting factors, Appendix I contains summaries of the cold transient, cold stabilized and hot transient portions of the FTP test as well as the idle HC and CO test results for each city and for the composite of all cities except Denver and Los Angeles. In addition, summary tables are also included using the 1972 FTP for ease in comparing with the results of previous years. Appendix II contains a summary of the questionnaire data concerning the ownership characteristics of the vehicles. To facilitate comparison with results of previous years, Appendix III contains summaries of the major results of the FY 71, FY 72, and FY 73 Programs.

Tables 5 through 14 present means and standard deviations of the emissions for each model year by city combination and a composite of all cities except Denver and Los Angeles. Tables 15 through 20 present the number and percent of vehicles meeting Federal 1972, 1973/1974, and 1975 standards for each city and for the composite of all cities except Denver and Los Angeles. Table 21 presents the percent of Los Angeles vehicles meeting the California standards for these years and Table 22 presents a summary of the emission and fuel economy data for 1975 model year Chicago vehicles as stratified by period of time since passing the City of Chicago Inspection.

Comparisons of FY 1974 results with previous years are contained in Tables 23 and 24. The vehicle emissions and fuel economy results by model year and inertia weight for the composite of all cities except Denver and Los Angeles are presented in Table 25. Denver and Los Angeles data are not presented in this format due to the small sample sizes that result in this stratification of the data.

Tables 26 through 33 summarize the fuel economy results for each model year by city combination and for a composite of all cities except Denver and Los Angeles. The vehicle emission results by manufacturer are presented as a composite of all cities except Denver and Los Angeles and for Denver and for Los Angeles in Tables 34 through 39. Tables 40 and 41 present emission levels for each response on the questions from the questionnaire concerning use of leaded fuel and presence of hydrogen sulfide odor. These were the only two questions for which significant relationships with emission levels were identified.

Finally, the results of the Highway Fuel Economy Tests, High and Low Speed Transient Cycle Tests, Modal and Loaded Modal Tests are presented in Tables 42 through 80.

3.2 DISCUSSION

The following paragraphs present a review of the FY74 Emission Factor Program in terms of identifying significant trends or differences with respect to major sources of possible effects. In particular, the emission data are considered in terms of city effects, performance of vehicles in first year of operation, degradation effects, fuel economy, manufacturer effects, and the correlation of emissions with ownership characteristics. The results of the loaded vehicle, highway fuel economy, and high and low speed transient cycle tests are also presented and discussed.

3.2.1 City Effects

The cities selected for the FY74 Emission Factor Program were chosen to represent a broad spectrum of regional, geographical, and meteorological attributes. The term "city effects" is used to describe the accumulation of all possible factors in a particular locality which might combine to yield emission levels which are characteristic of only that city. The emission results for the cities were compared by model year using the 1975 FTP emission levels given in Tables 5 through 12, the percent meeting federal standards in Tables 13 through 21, and the idle HC and idle CO measurements of Tables I-34 through I-41 of Appendix I.

The most noteworthy city effects discovered in the comparisons of the FTP emissions were those of Denver for all model years tested and of Los Angeles for 1975 model year vehicles. Denver vehicles displayed significantly larger average HC and CO emissions and significantly smaller average NOX emissions than those of other cities. These results agree with those of past EFP Programs and are attributed to Denver's altitude which affects carburetion by producing richer fuel mixture. Los Angeles displayed significantly lower HC and CO emissions in the 1975 model year vehicles than any of the other cities but the NOX emissions were not significantly different. Also, a significantly greater percentage of the 1975 Los Angeles cars met the Federal 49 State standards than those of the other cities. This result is contrasted with that of the FY74 Emission Factor Program in which the emissions from Los Angeles vehicles were similar to some of the other cities of that program. Since the 1975 California standards are more stringent than the 1975 49 State Federal standards, the observed differences in 1975 vehicles can be attributed to the difference in standards, the difference in emission control systems used to meet those standards, and the compliance techniques used to insure those standards. The difference between Los Angeles and the other cities is not consistently distinct for the other model years. The HC emissions

tend to be lower for 1974 and 1972 vehicles (and significantly lower than some of the cities) but the 1973 vehicles are indistinguishable from the other cities. A similar statement can be made for the CO emissions. NOX emissions are lower (but not significantly) for 1974 vehicles but indistinguishable for 1973 and 1972 vehicles. It should be noted that all Los Angeles differences should be viewed in terms of the relatively small sample of cars in each of the model years for this city.

No consistently significant differences are apparent when comparing the FTP emissions of the other five cities. Although a few of the individual city comparisons resulted in the conclusion of a significant difference for a particular model year, the differences were not sustained when other model years were compared. There was a trend for Houston vehicles to have higher HC and CO emissions, although these emissions were usually not significantly different from the emissions of vehicles in the other five cities. Since FY74 was the first time that a desert city (Phoenix) was included in the Emission Factor Program, it may be interesting to note that the emissions from Phoenix vehicles are within the range of emissions from vehicles of the other sites (except Denver and Los Angeles).

With respect to the idle HC and CO emissions, the comparisons between cities resulted in somewhat different conclusions. The following conclusions are generally true for all model years. The Los Angeles vehicles again have significantly lower emissions than those of all other cities. However, St. Louis has significantly greater idle HC emissions than all of the other cities and a trend to greater idle CO emissions than the other cities. Denver data show a trend to higher idle HC (except for St. Louis) and a somewhat stronger trend to higher idle CO but the differences in many of the individual comparisons are not significant. On the other hand, Phoenix displayed a trend to lower idle HC and idle CO emissions. It may be of interest to note that within a city average idle HC and average idle CO correlate reasonably well with average 1975 FTP HC and CO emissions, respectively. For the three cities for which data were available over 9 model

years (Chicago, Phoenix and St. Louis), the correlation coefficients ranged between 0.88 and 0.96. However, significantly different correlating equations were required for the individual cities. Therefore there is no contradiction in the agreement between St. Louis and the other cities in average 1975 FTP emissions and significant differences in idle HC and idle CO emissions.

Vehicles in Chicago are subjected to the City of Chicago Inspection Program. The results of this inspection were included in the FY74 Emission Factor Program by recording if each vehicle had passed, failed, or not yet been inspected. For those vehicles passing the inspection, the length of time (in three month increments) since the last inspection was also recorded. Table 22 presents the means and standard deviations of the emissions and fuel economy for the 1975 model year Chicago vehicles as stratified by the results of the Chicago inspection. The observed differences in average HC and CO emissions are not significant for the time periods since passing the inspection and for the vehicles not yet inspected. The average HC and CO emissions for vehicles having failed the inspection are significantly greater than the pooled average of those which passed. None of the differences in average NOX are significant.

Since Denver and Los Angeles stand out from the other cities in their FTP emissions, composites of all cities except Denver and Los Angeles have been generated and included in this report to facilitate comparisons of results with the previous program results. Note, however, that the FY74 program surveyed a different set of cities than those of the other programs. The results from the individual cities are also included for all data sets which contained a sufficient number of test vehicles.

3.2.2 Performance in First Year of Operation

An excellent method of determining the trends of emission in exhaust of in-use vehicles is to compare the results of the Emission Factor Programs for cars in their first year of operation by using the data from all fiscal years of the programs. This procedure minimizes the effect of

the degrading influences which will be discussed in paragraph 3.2.3. Table 23 presents the sample size and arithmetic mean and standard deviation of the emissions using the 1975 FTP for each model year in its first year of operation. The data for the 1971, 1972, and 1973 new model year vehicles were obtained from Reference (6). The composite means are over all cities except Denver and Los Angeles.

For the composite data, the 1975 model year vehicles displayed significant decreases in all three average emissions when compared with the previous model year vehicles in their first year of operation. Comparing 1974 to 1975 model year vehicles, average HC decreased 61%, average CO decreased 45% and average NOX decreased 16%. This is a reversal of a trend that was noted in the FY73 Program, Reference (6). In that Program, HC and CO emission increases with the 1973 and 1974 model year vehicles were interpreted as being the result of the imposition of the Federal NOX standard for the first time during these years. The 1975 levels, however, are also significantly below the 1972 levels for all three pollutants. This is apparently due to the manufacturers conversion to catalytic converters and improvements in the ignition system for emission control. It should be noted that the average 1975 model year vehicles had been driven an average of 8800 miles whereas the average mileage for the other years was approximately double. This possibly degrading effect can only be subjectively taken into account.

The average HC and CO emissions from 1975 model year vehicles in Denver are significantly lower than those of previous years. Compared to the 1974 model year vehicles, average HC was reduced 57% and average CO was reduced 42%. The 1975 model year average NOX emissions are not significantly less than those of the 1973 and 1974 model years but are significantly less than those of the 1971 and 1972 model years.

The 1975 model years in Los Angeles also had significant reductions in average HC and CO emissions. Compared to the 1974 model year vehicles, average HC was down 80% and average CO was down 82%. Comparisons with previous years yield greater percentage reductions. Average 1975 NOX emissions are 3% percent less than for 1974 which is not a significant decrease. The average 1975 NOX level is, however, significantly less than the averages of the 1973 and earlier model years.

3.5.3 Degradation Effects

It has been demonstrated in the previous Emission Factor Programs, that as the mileage of a vehicle increases so do the exhaust emissions. This effect is attributed to the combination of many factors including aging, engine maintenance practices, and repair. Although the mechanism for this effect cannot be accounted for in this program, it is of value to add to the body of data which demonstrates the trend. Table 24 presents a summary of the emission and fuel economy data that were obtained for each model year in the four Emission Factor Programs conducted to date. The data were derived using the 1975 FTP and are for the composite of all cities except Los Angeles and Denver.

Trends that were previously observed are generally continued by the addition of the FY74 Program. For each model year, mean mileage increases with time as represented by the four programs. Further, average HC and CO emissions tend to increase with age but in the newer model years this increase may be less significant. On the other hand average NOX emissions display no consistent pattern with time and, in fact, the inclusion of the FY74 data may indicate a decrease or leveling. All of these trends, however, must be viewed in terms of the uncertainty in the estimates of the means as would be reflected by confidence intervals about the observed averages.

It is interesting to note that the average fuel economy does not appear to be dependent on accumulated miles or on model year. In fact, the 1974 EFP had consistently higher fuel economy than the 1973 EFP for

all model years. The consistent fuel economy across model years may be partially explained by the change in model mix from year to year.

3.2.4 Fuel Economy

In conducting the emission test for a particular vehicle, the amount of CO_2 emitted was measured in addition to the pollutants of HC, CO and NOX. Since a fixed quantity of gasoline contains a known amount of carbon and the total carbon emitted was measured, the amount of gasoline used to traverse a fixed distance could be determined by the carbon balance method. This method was employed and the fuel economy data are reported in terms of miles per gallon i.e., the inverse of the variable gallons per mile which is measured. As previously mentioned, these data are summarized in terms of harmonic means and standard deviations to facilitate comparisons using the methods defined in Reference (5).

Table 25 presents the emissions data and fuel economy by combinations of model year and 500 lb increments of inertia weight for the composite of all cities except Denver and Los Angeles using the 1975 FTP. The known effect of inertia weight on fuel economy can easily be seen in this table by observing the significant decreases in fuel economy as weight increases for any particular model year. If there is an adverse effect on fuel economy due to the addition of emission control devices, it cannot be detected in this data. Tables 26 through 32 present summaries of the fuel economy data for each model year and city as well as the composite of all cities except Denver and Los Angeles. Included in these summaries are the cold transient, cold stabilized, and hot transient portions of the tests and the averages using the 1972 FTP and 1975 FTP weighting factors. These data reflect no significant differences when comparing cities or when comparing model years.

3.2.5 Manufacturer Effects

The emissions data for the 1975 model year vehicles were summarized for each manufacturer and these data are presented in Table 34 for the composite of all cities except Denver and Los Angeles, in Table 35

for Denver and Table 36 for Los Angeles. Similarly, the data for the light duty trucks are summarized in Tables 37 through 39. The manufacturer designated "other" represents a composite of foreign cars. Analyses were not performed on the Denver, Los Angeles, and light duty trucks data due to the small sample sizes.

Figure 1 presents 1975 model year emission averages and 95% confidence limits about the averages for each domestic manufacturer, the composite of foreign manufacturers, and the composite of American manufacturers. Differences between manufacturers can be assessed from this figure. It is interesting to note that although most foreign vehicles do not have catalytic converters, average CO and NOX emissions from foreign vehicles are significantly less than those of American vehicles while there is no significant difference between average HC emissions. For the composite of the 453 American vehicles the arithmetic averages and standard deviations of the emissions are as follows:

	Average	Standard Deviation
HC	1.32	1.08
CO	25.22	25.82
NOX	2.52	1.01

3.2.6 Correlation of Emissions with Ownership Characteristics

As an added element of the FY74 Emission Factor Program, each owner was required to complete a questionnaire concerning the vehicles' usage, maintenance, and damage history. The questions and response percentages are presented in Appendix II. The responses summarized are those given by the owners and the accuracy of the responses could not be checked. The extent to which owners misinterpreted the questions or gave the answers they thought were "correct" rather than true is not known although there is some indication of both of these sources of inaccuracies. The effect of such inaccuracies on subsequent analyses is also not known.

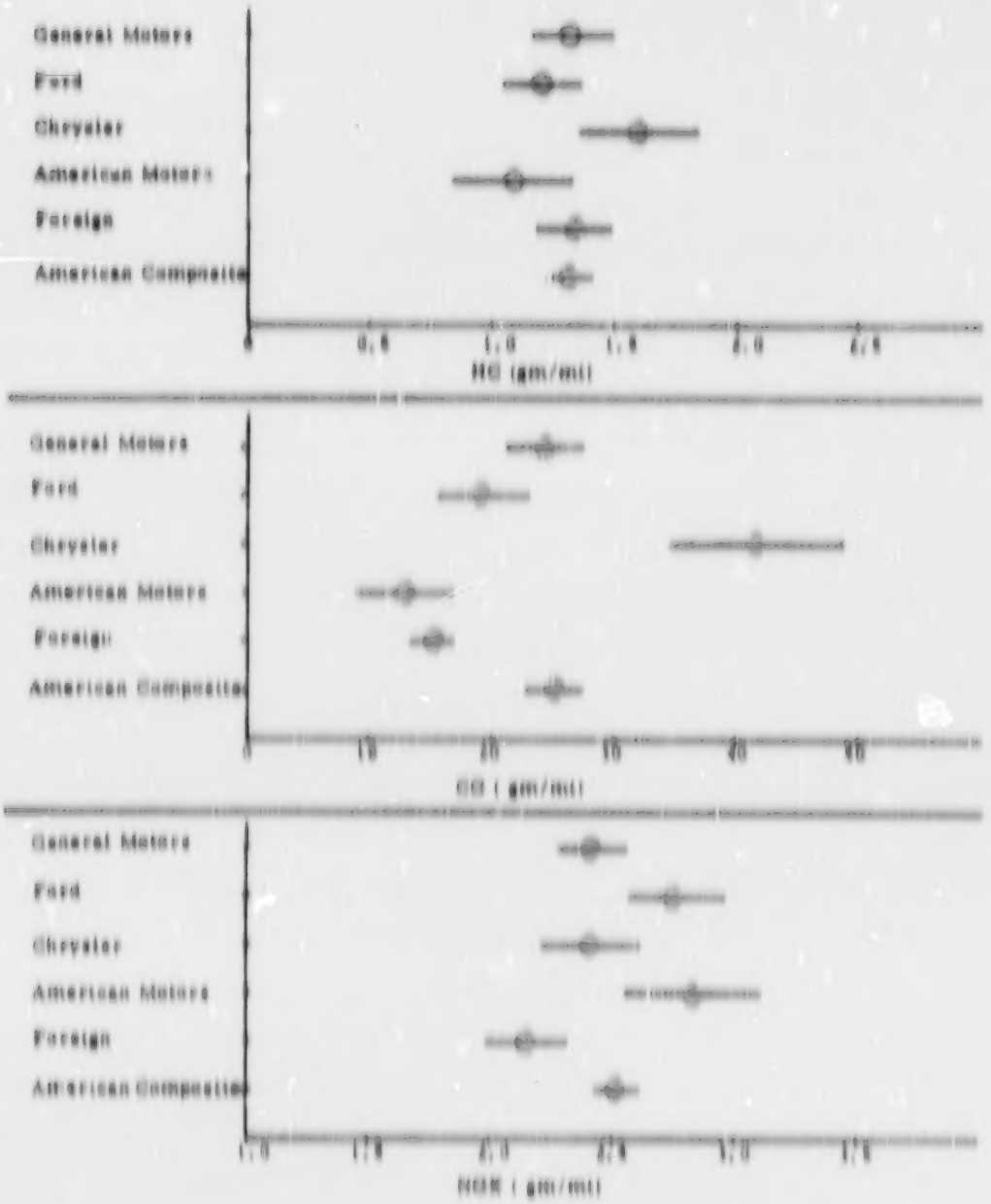

Figure 1. Average emissions and confidence limits for manufacturers-1975 model year vehicles, 1975 FTP.

The objective in the analysis of these data was to correlate emissions and fuel economy with the ownership characteristics of the questionnaire. Since the vehicles in the program were not chosen to represent a random sample of all in-use vehicles, since the responses to many of the questions could be influenced by the model year (particularly the 1975 models), and since there are model year differences in emission levels, the total data set had to be stratified by model year. However, in order to increase the sample size in each level of stratification, the model years were grouped in four categories: 1955-1967 models, 1968-1971 models, 1972-1974 models, and 1975 models. For each model year grouping, the arithmetic mean, standard deviation and sample size were obtained for each response to each question. This data set was then analyzed in an attempt to identify significant trends and differences as a function of questionnaire response.

For most of the replies, no significant trends could be identified when comparing vehicles of the same model year grouping. Some individual differences were significant for a particular model year but such differences tended to occur randomly and were contradicted (but not necessarily significantly) by the vehicles of the other model year groupings. It should also be noted that only relatively small sample sizes were available for many of the response-model year grouping combinations. The only significant conclusions that could be found in the data apply to the 1975 model year vehicles in response to the questions regarding use of leaded fuel and the presence of a hydrogen sulfide odor.

In the 1975 vehicles for which unleaded fuel is required, the average CO and idle CO emissions were significantly less for owners who have never used leaded fuel than the owners who regularly used leaded fuel. There were insufficient data points for other comparisons in this category but the trend was increasing HC, CO, idle HC and idle CO with increasing use of leaded fuel. The NOX emissions did not change significantly. The data for this model year-question reply are presented in Table 40. Replies to follow-up questions by owners who regularly use leaded fuel with a catalytic converter indicated that owners may have misunderstood the question.

The question concerning the presence of a hydrogen sulfide odor, is only pertinent to 1975 model year vehicles. The vehicles whose owners regularly detected this odor had significantly greater average HC, CO, idle HC and idle CO emissions and significantly smaller NOX emissions than those who never detect the odor. The data for this model year-question reply are presented in Table 41.

3.2.7 Highway Fuel Economy Tests

The Highway Fuel Economy Test was performed on forty-five 1975 model year vehicles (35 passenger cars and the 10 light duty trucks) in each city. The passenger cars were selected to match the characteristics of the 35 cars of the Washington and Los Angeles data sets, thus permitting valid comparisons between cities. The Highway Fuel Economy Test involved vehicle operation on the dynamometer over a 10.2 mile driving schedule of 765 seconds duration (48 mph). The test was started with the vehicle in a warmed-up condition defined as at least 7.9 miles of cyclic operation having occurred within the preceeding 35 minute period. The vehicle was operated at 50 mph for a period of three minutes. Within one minute of the end of this cruise period, the vehicle was brought to an idle condition and the test was started. A CVS sample bag was used to collect dilute exhaust for the purpose of emission and fuel economy calculations. Load settings, inertia weights and the speed and underhood cooling fan temperature tolerances of this test are identical to those of the FTP. The results of these tests are summarized in Tables 42 through 49. The city to city differences displayed in these tables are not statistically significant except for the lower average HC and CO emissions in Los Angeles and the higher average HC and CO emission in Denver as compared to those of the other cities.

To compare the Highway Fuel Economy Test Results with those from the 1975 FTP, the average 1975 FTP fuel economy was calculated for the same set of vehicles which had a Highway Fuel Economy Test for each city. These data are summarized in Table 50 which also presents

the ratio of the highway fuel economy to the 1975 FTP fuel economy. This ratio is relatively constant for all cities and indicates that the Highway Fuel Economy Test yields results which are approximately 41% greater than those of the 1975 FTP.

3.2.8 Low and High Speed Transient Cycle Tests

The Low and High Speed Transient Tests were conducted as part of the FY74 EFP in an effort to characterize in-use vehicle emissions at average speeds less than and greater than the average speed of the FTP, 19.6 mph. The Low and High Speed Transient Cycles have average speeds of 11.8 mph and 35.0 mph respectively. These tests were performed on the same thirty-five 1975 model passenger cars used in the Highway Fuel Economy Tests in each test site. In addition, twenty-five 1972 model passenger cars also were subjected to the Low and High Speed Transient Cycle Tests in each of the seven cities.

The Low Speed Transient Cycle Test is a mass emission test similar to the Federal Test Procedure in that it consists of cold transient, cold stabilized and hot transient portions. For the Low Speed Transient Cycle Test, however, the cold transient, cold stabilized and hot transient portion is collected in two parts. The first part is 240 seconds long, covers a distance of 0.82 miles and has an average speed of 12.28 mph. The second part is 412 seconds in duration, covers 0.91 miles with an average speed of 7.97 mph. Corresponding data on the cold stabilized portion are 658 seconds long over 2.56 miles or 14.01 mph while for the hot transient portion they are 652 seconds long over 1.73 miles or 9.56 mph. Total driving time excluding a ten minute soak is 1962 seconds.

The High Speed Transient Cycle Test is also similar to the Federal Test Procedure in that it consists of the three test portions but unlike the Low Speed Transient Cycle Test, the cold transient portion is completed in one part. Data on the cold transient portion are 520 seconds over 3.835 miles (26.550 mph); on the cold stabilized portion are 878 seconds over 9.773 miles

(40.072 mph); and on the hot transient portion are 520 seconds over 3.835 miles (26.550 mph). Total driving time exclusive of the soak is 1918 seconds.

The vehicle preconditioning (soak), driving techniques, and tolerances of these tests are identical to those of the Federal Test Procedure. The sampling techniques are also identical except for the dilute exhaust collection of the cold transient portion in two parts for the Low Speed Transient Cycle Tests.

Comparison of the 1972 or 1975 FTP emissions to the emissions from the Low and High Speed Transient Cycles can be made by weighting the cold transient, cold stabilized, and hot transient portions of these tests in the same proportion as the cold transient, cold stabilized, and hot transient portions of the FTP are weighted to produce 1972 or 1975 FTP results. The Low and High Speed Cycle emissions results which are weighted similar to the 1972 or 1975 FTP will be labeled as the 1972 and 1975 weighting in this report.

The results of the Low and High Speed Transient Cycle Tests are presented in Tables 51 through 58. The low speed cycle produces significantly more hydrocarbon and carbon monoxide and less NOX than the high speed cycle. Fuel economy is greater in the high speed cycle than in the low speed cycle. The 1975 vehicles produce significantly less of all three emissions than the 1972 vehicles.

Table 59 presents the ratios of the average high speed weighting to the average FTP emissions and fuel economy for the composite of all cities except Denver and Los Angeles, for Denver, and for Los Angeles. Table 60 presents similar ratios of the average low speed weightings. As compared to the FTP, these tables also display that high speeds yield lower HC and CO emissions, higher NOX emissions and higher fuel economies than the low speeds.

1.5.9 Modal Emission Sequence

To develop models which are descriptive of the emission levels during various phases of vehicle operation, it is necessary to have available emission factors for a variety of steady states and driving modes.

References (7) and (8). Toward this end a Surveillance Driving Sequence (SDS) has been established which defines average acceleration/deceleration transition rates between all combinations of 0 mph, 15 mph, 30 mph, 45 mph, and 60 mph. In addition, acceleration/deceleration rates both higher and lower than the average values were defined as transitions only between all paired combinations of 0 mph, 30 mph, and 60 mph. The Surveillance Driving Sequence for transitions thus consists of 33 acceleration/deceleration modes and 7 (seven) steady conditions defined as idle, 5 mph, 10 mph, 15 mph, 30 mph, 45 mph and 60 mph. Table 61 lists the various transition modes of the sequence with the corresponding time in mode, average speed, average acceleration/deceleration rate, and distance traveled.

Modal tests were performed on the same forty-five 1975 model year vehicles that were subjected to the Highway Fuel Economy Test in each test site of the FY74 EFP. In addition thirty 1972 model year, thirty-five 1973 model year, and ten 1974 model year vehicles were tested on the modal sequence in each site of the FY73 EFP. The 1972-1974 model year vehicles modal results are also presented in this report for purposes of comparison.

Tables 62 through 70 present the average emission and fuel economy obtained in each of the transition and steady state modes of the Surveillance Driving Sequence in the FY74 EFP and FY73 EFP. Average values are presented for low altitude, non-California sites, Denver, and Los Angeles for 1975 model year automobiles, 1975 model year light-duty trucks, 1974 model year automobiles, 1973 model year automobiles and 1972 model year automobiles.

3.3.10 Loaded Vehicle and Vehicle Towing Trailer Tests

In addition to the normal tests of the Emission Factor Program, 15 vehicles from Houston and Phoenix were subjected to loaded modal testing to simulate the addition of passengers and the towing of a trailer. These tests were conducted on 6 passenger cars of the 1974 model year, 6 passenger

cars of the 1975 model year, and 3 light duty trucks of the 1975 model year. The test sequence used was the Surveillance Driving Sequence of 12 accelerations/decelerations modes and 7 steady states as described in Section 3.2.9. The results of these tests are presented in Tables 77 through 80. Test 1 represents the inertia weight and road load settings as specified in the Federal Register. Test 2 simulated the addition of 500 lbs of passengers and baggage by increasing the inertia weight by 500 lbs. without changing the road load setting. Test 3 represents a condition which simulated the towing of a 1000 lbs trailer of a size recommended as suitable for the given vehicle. This condition is achieved by increasing the inertia weight by 1000 lbs and using a road load power setting as empirically determined from road tests.

Tables 77, 78, and 79 summarize the data for the three individual types of vehicles while Table 80 is a summary of all 15 vehicles for all 12 modes. The row labeled SDS represents the Surveillance Driving Sequence weighted average of the individual modes. It is apparent from the tables that higher average HC, CO and NOX emissions and lower fuel economy results as the loading is increased. These changes are particularly large in comparing the 500 lb test with the 1000 lb test. It should be noted that, although emissions tend to increase with increasing weight in these tests, it cannot necessarily be concluded that a vehicle of light weight design will necessarily have lower emissions than a vehicle of heavy design (see Table 25). With respect to vehicular design, differences in weight can be offset by adjustments to power plants and transmissions.

The data of Tables 77, 78, and 79 also indicate that, of the steady state speeds tested, fuel economy is greatest at 30 mph, HC and CO emissions tend to decrease with increasing speed although at the higher speeds the trends of the emissions are not consistent, and NOX emissions increase with speed. The steady state driving cycles are not representative of normal stop and go driving. The FTP, highway, high and low speed cycles are transient cycles which are representative of consumer driving

at various speeds. Therefore, fuel economy and emissions estimates over three transient cycles are better estimates of fuel economy and emissions levels from the in-use vehicle population.

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TABLE 5

[illegible]

TABLE 6

[illegible]
[illegible]
1975 FTP

YEAR	N	MEAN MILES (KM)	HYDROCARBONS (GRAMS/MILE) ARITHMETIC	HYDROCARBONS (GRAMS/MILE) ARITHMETIC SD	HYDROCARBONS (GRAMS/MILE) GEOMETRIC	HYDROCARBONS (GRAMS/MILE) GEOMETRIC SD	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC SD	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC SD	NOX (GRAMS/MILE) ARITHMETIC	NOX (GRAMS/MILE) ARITHMETIC SD	NOX (GRAMS/MILE) GEOMETRIC	NOX (GRAMS/MILE) GEOMETRIC SD
65-67	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1968	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1969	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1970	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1971	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1972	25	47.6	5.77	6.27	3.97	2.17	79.48	66.73	50.36	2.39	3.94	1.70	3.54	1.62
1973	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1974	38	24.7	3.57	1.65	3.12	1.61	47.28	25.74	40.21	2.02	2.81	1.34	2.55	1.79
1975	1127	9.6	1.49	1.29	1.36	1.34	21.11	10.69	18.41	2.31	2.59	1.30	2.34	1.61
75&UP	38	11.1	1.46	0.39	1.37	1.41	25.38	21.13	19.99	3.47	2.22	0.71	2.02	1.36

TABLE 7

[illegible]
[illegible]
[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 8

[illegible]

TABLE 9

[illegible]

			[illegible]												
		MEAN MOLES	ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC	
[illegible]	n	WET	[illegible]	SD	[illegible]	SD	[illegible]	SD	[illegible]	SD	[illegible]	SD	[illegible]	SD
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	25	98.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	0	0.0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	30	19.8	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	15	11.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	10	6.2	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 10

[illegible]

[illegible]																	

TABLE II

[illegible]

[illegible]																	

TABLE 12

[illegible] EMISSION FACTORS PROGRAM
[illegible] RESULTS FOR "LOS ANGELES
1975 FTP

			HYDROCARBONS (GRAMS/MILE)				CARBON MONOXIDE (GRAMS/MILE)				NOX (GRAMS/MILE)			
			ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC	
YEAR	#	MILES DRIVEN	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 13

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR CHICAGO

PERCENT MEETING FEDERAL STANDARDS

YEAR	1972 FTP TEST DATA PASSED 1972 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1975** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
66-67	1	8.00	0	0.00	0	0.00
1968	9	10.00	0	0.00	0	0.00
1969	1	2.00	0	0.00	0	0.00
1970	2	8.00	2	8.00	0	0.00
1971	5	6.67	5	6.67	0	0.00
1972	10	10.81	1	1.08	0	0.00
1973	18	25.33	3	8.88	0	0.00
1974	19	38.30	5	10.96	0	0.00
1975	130	77.38	90	58.97	55	32.74
TOTAL	9	90.00	9	90.00	9	90.00

TABLE 14

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR HOUSTON

PERCENT MEETING FEDERAL STANDARDS

YEAR	1972 FTP TEST DATA PASSED 1972 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1975** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
66-67	0	0.00	0	0.00	0	0.00
1968	1	5.00	0	0.00	0	0.00
1969	0	0.00	0	0.00	0	0.00
1970	0	0.00	0	0.00	0	0.00
1971	1	5.00	1	5.00	0	0.00
1972	6	20.00	0	0.00	0	0.00
1973	1	8.00	0	0.00	0	0.00
1974	7	25.93	3	10.67	1	3.70
1975	66	71.79	55	59.80	30	32.55
TOTAL	6	60.00	6	60.00	6	60.00

* The 1972 Standards are 3.4 gm/mi for HC and 39 gm/mi for CO

** The 1973/74 Standards are 3.4 gm/mi HC, 39 gm/mi CO, 3.0 gm/mi NOX

*** The 1975 Standards are 1.5 gm/mi HC, 15 gm/mi CO, 3.1 gm/mi NOX

TABLE 15

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR FAIRBANKS

PERCENT MEETING FEDERAL STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975* STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975/1976** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
68-69	0	0.00	0	0.00	0	0.00
1970	2	11.76	1	5.88	0	0.00
1971	0	0.00	0	0.00	0	0.00
1972	2	10.53	2	10.53	0	0.00
1973	1	5.26	1	5.26	0	0.00
1974	3	20.00	3	18.00	0	0.00
1975	11	50.75	4	18.18	0	0.00
1976	13	59.09	11	50.00	0	0.00
1978	64	91.70	64	84.70	59	83.33
TOTAL	7	28.00	6	50.00	0	00.00

TABLE 16

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR ST. LOUIS

PERCENT MEETING FEDERAL STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975* STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975/1976** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
68-69	0	0.00	0	0.00	0	0.00
1970	1	3.33	0	0.00	0	0.00
1971	2	5.71	2	5.71	0	0.00
1972	2	10.00	1	2.00	0	0.00
1973	10	22.22	3	6.67	0	0.00
1974	16	32.00	5	10.00	0	0.00
1975	19	36.00	13	26.00	1	2.00
1976	31	62.00	16	32.00	1	2.00
1978	114	76.67	96	64.00	69	46.00
TOTAL	7	0.00	5	50.00	2	00.00

* The 1973 Standards are 3.4 gm/mi for HC and 39 gm/mi for CO

** The 1973/74 Standards are 3.4 gm/mi HC, 39 gm/mi CO, 3.0 gm/mi NOX

*** The 1975 Standards are 1.5 gm/ HC, 15 gm/mi CO, 3.1 gm/mi NOX

TABLE 17

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR WASHINGTON

PERCENT MEETING FEDERAL STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975* STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1974** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
66-67	0	0.00	0	0.00	0	0.00
1968	0	0.00	0	0.00	0	0.00
1969	0	0.00	0	0.00	0	0.00
1970	0	0.00	0	0.00	0	0.00
1971	0	0.00	0	0.00	0	0.00
1972	2	66.00	0	0.00	0	0.00
1973	0	0.00	0	0.00	0	0.00
1974	6	18.87	5	15.38	0	0.00
1975	31	66.67	17	48.57	16	45.00
TOTAL	8	66.66	4	66.66	4	66.66

TABLE 18

1975 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR ALL VEHICLES SAMPLED LOS ANGELES AIR OFFICE

PERCENT MEETING FEDERAL STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975* STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1974** STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1975*** STANDARDS NUMBER	PERCENT
66-67	1	0.79	0	0.00	0	0.00
1968	4	7.79	1	1.90	0	0.00
1969	1	3.84	2	8.67	0	0.00
1970	4	6.06	3	5.08	0	0.00
1971	15	13.27	7	6.19	0	0.00
1972	53	26.63	6	3.11	0	0.00
1973	61	32.01	29	15.36	1	0.78
1974	61	31.01	53	32.08	2	1.06
1975	666	76.64	520	64.91	316	36.80
TOTAL	37	74.00	29	58.00	29	58.00

* The 1972 Standards are 3.4 grn/mi for HC and 39 gm/mi for CO

** The 1973/74 Standards are 3.4 gm/mi HC, 39 gm/mi CO, 3.0 gm/mi NOX

*** The 1975 Standards are 1.5 gm/ HC, 15 gm/mi CO, 3.1 gm/mi NOX

TABLE 19

[illegible] EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR DENVER

PERCENT MEETING FEDERAL STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1975 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1976 STANDARDS NUMBER	PERCENT
[illegible]	0	0.00	0	0.00	0	0.00
1968	0	0.00	0	0.00	0	0.00
1969	0	0.00	0	0.00	0	0.00
1970	0	0.00	0	0.00	0	0.00
1971	0	0.00	0	0.00	0	0.00
1972	0	0.00	0	0.00	0	0.00
1973	0	0.00	0	0.00	0	0.00
1974	0	0.00	0	0.00	0	0.00
1975	10	58.87	10	58.87	3	0.71
TOTAL	4	40.00	3	30.00	3	30.00

TABLE 53

[illegible] EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR LOS ANGELES

PERCENT MEETING FEDERAL OR STATE STANDARDS

YEAR	1975 FTP TEST DATA PASSED 1975 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1973/1975 STANDARDS NUMBER	PERCENT	1975 FTP TEST DATA PASSED 1976 STANDARDS NUMBER	PERCENT
[illegible]	0	0.00	0	0.00	0	0.00
1968	0	0.00	0	0.00	0	0.00
1969	0	0.00	0	0.00	0	0.00
1970	0	0.00	0	0.00	0	0.00
1971	0	0.00	0	0.00	0	0.00
1972	1	20.00	1	10.00	0	0.00
1973	10	58.19	9	15.81	0	0.00
1974	10	58.87	8	29.87	1	4.11
1975	55	100.00	55	80.00	55	76.39
TOTAL	9	90.00	7	70.00	7	70.00

* The 1972 Standards are 3.4 gm/mi for HC and 39 gm/mi for CO

** The 1973/74 Standards are 3.4 gm/mi HC, 39 gm/mi CO, 3.0 gm/mi NOX

*** The 1975 Standards are 1.5 gm/mi HC, 15 gm/mi CO, 3.1 gm/mi NOX

TABLE 21

[illegible]

[illegible]	1972 FTP TEST DATA PASSED 1972** STANDARDS		1972 FTP TEST DATA PASSED 1973** STANDARDS		1972 FTP TEST DATA PASSED 1975*** STANDARDS		1975 FTP TEST DATA [illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 22

MEAN EMISSIONS OF THE 1975 MODEL YEAR CHICAGO VEHICLES, CATEGORIZED BY TIME SINCE LAST PASSING THE CITY OF CHICAGO INSPECTION

	EMISSION RESULTS FOR 1975 CHICAGO VEHICLES									
	N	HYDROCARBONS		CARBON MONOXIDE		NOx		FUEL ECONOMY	
		MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
PASSED INSPECTION (9 TO 12 MONTHS PREVIOUSLY)	7	1.86	0.60	37.92	24.62	2.41	0.26	10.74	1.14
PASSED INSPECTION (6 TO 9 MONTHS PREVIOUSLY)	25	1.31	0.63	22.94	24.05	2.79	0.87	12.24	1.56
PASSED INSPECTION (3 TO 6 MONTHS PREVIOUSLY)	26	1.27	0.79	25.67	35.96	2.42	0.86	12.00	2.47
PASSED INSPECTION (0 TO 3 MONTHS PREVIOUSLY)	58	1.24	0.97	17.36	13.48	2.46	0.74	13.48	2.19
NOT INSPECTED	48	1.38	0.86	22.10	19.89	2.37	0.97	13.94	3.63
FAILED INSPECTION	24	1.77	0.94	38.92	26.58	2.29	0.47	12.96	3.46

TABLE 23

COMPARISON OF MEAN EMISSION LEVELS OF NEW VEHICLES* IN THE FY71, FY72, FY73, AND FY74 EMISSION FACTOR PROGRAMS

FISCAL YEAR TESTED AND MODEL YEAR		[illegible] FTP (grams/mile)								
		[illegible]			[illegible]			Los Angeles		
		SAMPLE SIZE	MEAN	S.D.	SAMPLE SIZE	MEAN	S.D.	SAMPLE SIZE	MEAN	S.D.
HC	1970	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1971	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
CO	1970	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1971	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
NOX	1970	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1971	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1972	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1973	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1974	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	1975	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

*Vehicles tested in approximately their first year of operation.

TABLE 24a

1975 FTP MEAN EMISSION LEVELS BY MODEL YEAR FOR
FY71, FY72, FY73, AND FY74 PROGRAMS —
COMPOSITE OF ALL CITIES EXCEPT LOS ANGELES AND DENVER

[illegible]

YEAR		FY71 Program		FY72 Program		FY73 Program		FY74 Program	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
[illegible]	HC	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	Aver. Wt.	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NOX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MPG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	HC	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	Aver. Wt.	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NOX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MPG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	HC	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	Aver. Wt.	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NOX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MPG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	HC	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	Aver. Wt.	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	CO	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	NOX	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	MPG	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 24b

[illegible] FTP MEAN EMISSION LEVELS BY MODEL YEAR
FOR FY 71, FY 72, FY 73, AND FY 74 PROGRAMS
COMPOSITE OF ALL CITIES EXCEPT LOS ANGELES AND DENVER

Emissions in Gm/Mi, Fuel Economy in MPG
Average Mileage in Thousands

YEAR		1971 Program		1972 Program		1973 Program		1974 Program	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
[illegible]	#	[illegible]	—	[illegible]	—	[illegible]	—	[illegible]	—
	Av. Mi.	35.6	—	35.4	—	37.4	—	46.5	—
	HC	3.97	1.36	3.96	2.22	4.22	2.39	5.23	6.28
	CO	38.76	27.42	51.13	37.62	50.53	32.29	52.69	37.16
	NOX	5.36	1.84	4.38	1.58	4.83	2.01	3.98	1.33
	MPG	13.1	4.4	14.48	4.34	12.93	3.45	13.58	3.52
[illegible]	#			[illegible]	—	[illegible]	—	[illegible]	—
	Av. Mi.			34.8	—	36.7	—	45.9	—
	HC			3.82	2.22	4.07	3.85	4.23	4.58
	CO			35.88	26.39	55.74	42.48	51.79	48.71
	NOX			4.55	1.59	4.88	2.09	4.83	1.48
	MPG			13.54	3.48	12.85	3.34	13.49	3.75
[illegible]	#					[illegible]	—	[illegible]	—
	Av. Mi.					38.1	—	29.9	—
	HC					3.59	1.61	3.33	1.78
	CO					45.76	32.48	45.33	46.42
	NOX					3.47	1.63	3.81	1.62
	MPG					12.58	3.38	13.82	3.40
[illegible]	#					[illegible]	—	[illegible]	—
	Av. Mi.					5.9	—	39.2	—
	HC					3.58	1.32	3.58	2.37
	CO					55.77	34.39	45.77	35.49
	NOX					2.98	1.19	2.89	1.48
	MPG					11.39	2.46	12.77	3.39

TABLE 25

FY'74 EMISSION FACTOR PROGRAM

EMISSION RESULTS FOR ALL CITIES EXCEPT LOS ANGELES AND DENVER

BY MODEL YEAR AND INERTIA WEIGHT

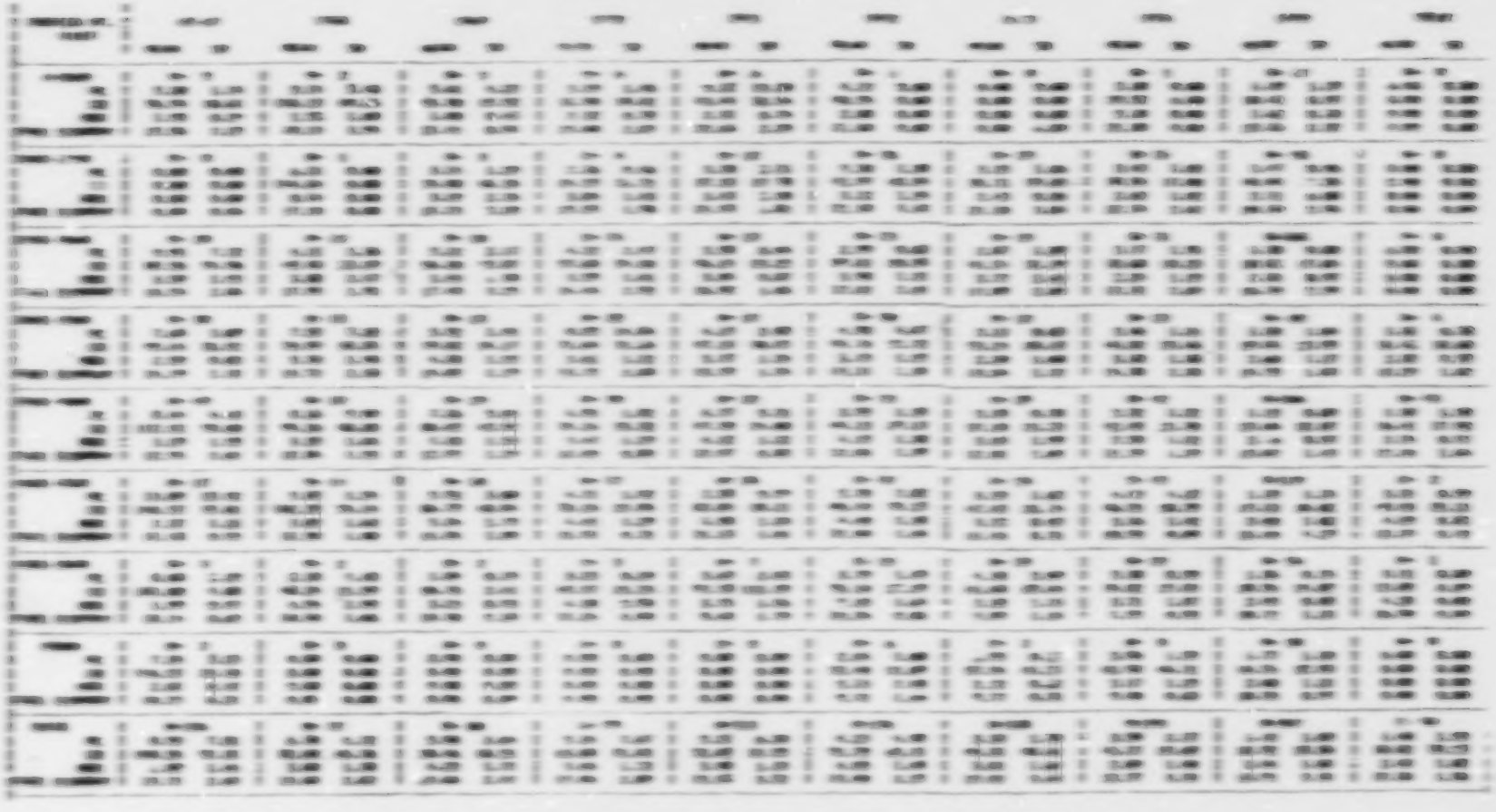

TABLE 36

FY74 Emission Factor Program
Fuel Economy Results for Chicago

FUEL ECONOMY IN MILES PER GALLON

YEAR	N	COLD TRANSIENT MEAN	COLD TRANSIENT SD	COLD STABILIZED MEAN	COLD STABILIZED SD	HOT TRANSIENT MEAN	HOT TRANSIENT SD	1975 FTP MEAN	1975 FTP SD	1975 HFET MEAN	1975 HFET SD
66-67	20	11.28	0.79	13.20	0.75	13.26	0.61	13.78	0.73	13.71	0.88
1968	10	11.06	1.04	13.19	0.78	13.06	1.00	13.48	0.78	13.61	0.81
1969	15	11.75	1.16	13.01	0.98	13.08	1.03	13.68	0.92	13.87	0.93
1970	40	11.78	1.16	13.04	0.80	13.09	1.03	13.88	0.86	13.86	0.76
1971	51	11.68	1.00	13.09	0.78	13.07	1.10	13.80	0.83	13.88	0.77
1972	61	11.85	1.01	13.01	0.92	13.11	1.02	13.91	0.87	13.98	0.86
1973	61	11.82	1.06	13.06	0.89	13.03	1.04	13.78	0.87	13.88	0.83
1974	84	11.92	1.17	13.00	0.79	13.06	1.00	13.78	0.90	13.91	0.80
1975	168	11.94	0.90	13.01	0.11	13.07	0.81	13.68	0.87	13.98	0.12
TOTAL	10	10.18	0.93	11.08	0.87	10.87	0.78	10.77	0.93	11.36	0.81

TABLE 37

FY74 Emission Factor Program
Fuel Economy Results for Houston

FUEL ECONOMY IN MILES PER GALLON

YEAR	N	COLD TRANSIENT MEAN	COLD TRANSIENT SD	COLD STABILIZED MEAN	COLD STABILIZED SD	HOT TRANSIENT MEAN	HOT TRANSIENT SD	1975 FTP MEAN	1975 FTP SD	1975 HFET MEAN	1975 HFET SD
66-67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	89	11.97	1.00	13.07	0.84	13.08	0.87	13.73	0.88	13.88	0.87
1973	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	90	11.89	1.11	13.01	0.87	13.08	0.73	13.78	0.15	13.87	0.81
1975	117	12.01	0.88	13.01	0.10	13.07	0.78	13.68	0.10	13.88	0.10
TOTAL	10	13.77	1.90	11.10	0.10	10.79	0.88	10.98	0.01	11.48	0.11

TABLE 38

FY74 Emission Factor Program

Fuel Economy Results for Phoenix

FUEL ECONOMY IN MILES PER GALLON

		COLD TRANSIENT		COLD STABILIZED		HOT TRANSIENT		1975 FTP		1975 HFP	
YEAR	N	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
68-67	60	16.81	0.38	18.16	0.19	18.81	0.78	18.06	0.61	18.73	0.80
1968	17	15.89	0.65	16.36	0.50	16.56	0.71	15.78	0.56	16.66	0.89
1969	18	16.36	0.88	17.06	0.50	17.38	0.99	16.19	0.63	16.15	0.93
1970	19	16.28	0.32	16.18	0.13	16.88	0.82	15.91	0.57	16.63	0.16
1971	69	15.63	0.05	16.63	0.06	16.79	0.06	15.83	0.67	16.09	0.61
1972	69	16.67	0.91	17.06	0.08	17.08	0.76	16.13	0.67	16.96	0.12
1973	67	15.56	0.89	16.38	0.60	16.88	0.33	15.97	0.68	16.76	0.88
1974	60	15.30	0.31	16.97	0.86	16.76	0.91	15.98	0.33	16.87	0.89
1975	137	16.99	0.83	17.97	0.86	17.78	0.91	16.98	0.33	16.87	0.86
TOTAL	10	17.01	1.38	18.99	1.90	18.13	1.79	18.29	1.31	18.99	1.18

TABLE 39

FY74 Emission Factor Program

Fuel Economy Results for St. Louis

FUEL ECONOMY IN MILES PER GALLON

		COLD TRANSIENT		COLD STABILIZED		HOT TRANSIENT		1975 FTP		1975 HFP	
YEAR	N	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
68-67	30	14.96	0.28	16.00	0.38	15.19	0.66	15.06	0.56	15.75	0.58
1968	30	15.10	0.86	15.89	0.75	15.04	0.71	14.88	0.61	15.69	0.85
1969	38	14.79	0.63	15.11	0.50	15.06	0.82	14.88	0.61	15.85	0.30
1970	30	15.01	0.08	15.86	0.72	15.00	0.56	14.97	0.69	15.90	0.99
1971	68	15.46	0.87	15.98	0.18	15.84	0.83	14.87	0.85	15.93	0.17
1972	30	15.88	0.08	15.87	0.30	15.88	0.89	15.08	0.18	15.86	0.38
1973	30	15.50	0.87	15.88	0.49	15.85	0.48	15.03	0.18	15.11	0.39
1974	30	15.99	0.13	15.77	0.86	15.71	0.93	15.08	0.08	15.10	0.86
1975	130	15.19	0.86	15.60	0.17	15.91	0.88	15.28	0.18	15.81	0.28
TOTAL	10	11.98	0.88	16.01	1.10	15.91	0.88	11.97	0.99	16.48	0.96

TABLE 30

FY74 Emission Factor Program
Fuel Economy Results for Washington

FUEL ECONOMY IN MILES PER GALLON

YEAR	N	COLD TRANSIENT MEAN	COLD TRANSIENT SD	COLD STABILIZED MEAN	COLD STABILIZED SD	HOT TRANSIENT MEAN	HOT TRANSIENT SD	LOW STP MEAN	LOW STP SD	LOW STP MEAN	LOW STP SD
68-69	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	88	14.31	1.69	15.86	1.90	15.35	1.97	14.78	1.78	15.96	1.86
1973	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1974	86	11.93	1.03	14.62	1.75	15.07	1.78	11.38	1.14	15.81	1.98
1975	89	12.34	1.08	15.34	1.68	14.86	1.87	11.8	1.28	15.81	1.61
POLDT	10	11.95	1.69	12.96	1.89	15.89	1.97	14.89	1.68	15.99	1.85

TABLE 31

FY74 Emission Factor Program
Fuel Economy Results for All Cities Except Los Angeles and Denver

FUEL ECONOMY IN MILES PER GALLON

YEAR	N	COLD TRANSIENT MEAN	COLD TRANSIENT SD	COLD STABILIZED MEAN	COLD STABILIZED SD	HOT TRANSIENT MEAN	HOT TRANSIENT SD	LOW STP MEAN	LOW STP SD	LOW STP MEAN	LOW STP SD
68-67	169	12.68	0.00	15.88	0.00	15.27	0.00	14.98	0.78	15.71	0.83
1968	99	12.06	0.91	15.64	0.63	15.30	0.87	14.77	0.87	15.66	0.84
1969	88	12.38	0.64	15.51	0.54	15.81	0.78	14.87	0.38	15.88	0.63
1970	98	12.58	0.98	15.68	0.78	15.78	0.68	15.05	0.61	15.86	0.89
1971	119	12.36	0.39	15.48	0.80	15.10	0.88	14.88	0.36	15.85	0.83
1972	176	12.49	0.36	15.68	0.98	15.19	0.13	14.87	0.87	15.66	0.78
1973	188	12.86	0.46	15.67	0.38	15.69	0.84	14.87	0.89	15.88	0.83
1974	169	11.96	0.11	15.58	0.31	15.35	0.71	14.18	0.13	15.88	0.88
1975	207	12.83	0.85	15.83	0.49	15.89	0.71	14.88	0.13	15.81	0.81
POLDT	88	11.89	1.48	11.88	1.83	15.27	1.88	11.96	1.98	15.19	1.96

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TABLE 12

FY74 Emission Factory Programs

Fuel Economy Results for Denver

		FUEL ECONOMY IN MILES PER GALLON									
		COLD TRANSIENT		COLD STABILIZED		HOT TRANSIENT		LOTS RTP		LOTS RTP	
YEAR	N	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
68-67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	89	13.19	3.35	13.94	3.47	16.76	3.77	13.89	3.28	15.41	3.51
1973	87	14.68	3.69	15.58	3.96	18.18	3.98	13.06	3.37	15.69	3.54
1974	90	14.82	3.65	15.95	3.93	19.87	3.79	12.93	3.19	15.82	3.82
1975	88	15.45	3.38	16.42	3.57	19.87	4.01	13.04	3.29	15.59	3.88
POLOT	10	15.36	0.41	16.03	0.79	19.47	0.88	14.01	0.74	15.58	0.76

TABLE 13

FY74 Emission Factor Programs

Fuel Economy Results for Los Angeles

		FUEL ECONOMY IN MILES PER GALLON									
		COLD TRANSIENT		COLD STABILIZED		HOT TRANSIENT		LOTS RTP		LOTS RTP	
YEAR	N	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
68-67	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1968	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1969	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1970	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1971	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1972	89	10.91	3.18	11.69	3.39	13.72	3.74	13.88	3.38	14.08	3.61
1973	87	10.49	3.41	11.07	3.66	15.88	3.89	10.68	3.61	12.16	3.87
1974	90	11.12	3.01	11.77	3.26	15.59	3.61	11.08	3.06	12.07	3.28
1975	88	11.89	3.08	12.47	3.48	14.17	3.91	10.19	3.07	12.76	3.30
POLOT	10	11.13	1.63	11.94	1.88	13.13	1.58	11.86	1.68	12.87	1.81

TABLE 34

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 35

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 36

[illegible]

MANUFACTURER	#	MEAN MILES	[illegible]				[illegible]				[illegible]				[illegible]		
[illegible]	15	9.6	0.59	0.29	0.53	1.41	6.42	4.78	5.04	2.68	2.53	1.56	2.26	1.67	[illegible]	[illegible]	[illegible]
FORD	7	6.7	0.48	0.22	0.42	1.87	4.38	3.23	3.31	2.36	2.24	0.85	1.78	1.51	[illegible]	[illegible]	[illegible]
CHRYSLER	5	7.7	0.42	0.23	0.38	1.65	4.26	3.44	3.29	2.35	2.52	0.97	2.38	1.44	[illegible]	[illegible]	[illegible]
AMER. MOTORS	1	9.0	0.36	0.00	0.36	0.00	15.86	0.00	15.09	0.00	1.61	0.00	1.61	0.00	[illegible]	[illegible]	[illegible]
OTHERS	6	8.2	0.59	0.47	0.49	2.28	10.29	13.53	6.13	7.85	2.28	0.29	2.25	1.26	[illegible]	[illegible]	[illegible]
TOTAL	35	8.1	0.52	0.29	0.47	1.86	6.59	6.87	4.87	2.23	2.38	1.34	2.17	1.52	[illegible]	[illegible]	[illegible]

TABLE 37

[illegible]

MANUFACTURER	#	MEAN MILES	[illegible]				[illegible]				[illegible]				[illegible]		
[illegible]	45	6.7	1.07	1.25	0.91	2.34	15.76	11.14	9.85	2.59	2.45	1.49	2.27	1.66	[illegible]	[illegible]	[illegible]
FORD	78	10.4	1.72	1.35	1.23	2.32	18.51	21.76	17.56	3.43	2.36	0.93	2.23	1.56	[illegible]	[illegible]	[illegible]
CHRYSLER	5	9.6	1.43	1.38	1.42	1.91	31.22	34.19	27.83	1.73	2.62	1.24	2.66	1.42	[illegible]	[illegible]	[illegible]
AMER. MOTORS	9	8.9	0.78	1.28	0.78	0.34	0.36	0.57	0.38	0.68	0.38	0.44	0.38	0.38	[illegible]	[illegible]	[illegible]
OTHERS	6	8.3	0.50	0.38	0.42	0.84	0.60	0.84	0.38	0.68	0.38	0.44	0.38	0.38	[illegible]	[illegible]	[illegible]
TOTAL	90	8.2	1.17	1.35	1.09	2.15	16.32	19.69	11.89	2.77	2.45	1.47	2.28	1.65	[illegible]	[illegible]	[illegible]

TABLE 38

[redacted]

MANUFACTURER	N	MEAN MILES (M)	HYDROCARBONS (GRAMS/MILE) ARITHMETIC MEAN	HYDROCARBONS (GRAMS/MILE) ARITHMETIC SD	HYDROCARBONS (GRAMS/MILE) GEOMETRIC MEAN	HYDROCARBONS (GRAMS/MILE) GEOMETRIC SD	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC MEAN	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC SD	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC MEAN	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC SD	NOX (GRAMS/MILE) ARITHMETIC MEAN	NOX (GRAMS/MILE) ARITHMETIC SD	NOX (GRAMS/MILE) GEOMETRIC MEAN	NOX (GRAMS/MILE) GEOMETRIC SD	% RECALL HC	% RECALL CO	% RECALL NOX
[redacted]	5	17.0	3.50	2.59	2.97	3.46	51.79	46.77	36.39	2.95	3.80	6.47	1.72	3.39	40	40	[redacted]
[redacted]	4	8.8	1.80	4.73	1.47	3.04	34.45	38.54	20.50	2.29	1.61	5.94	1.38	3.87	25	25	[redacted]
[redacted]	1	15.0	3.30	0.00	3.30	0.00	52.17	0.00	52.17	0.00	2.10	0.00	2.10	0.00	0	0	[redacted]
[redacted]	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	[redacted]
[redacted]	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	[redacted]
[redacted]	10	[redacted]	2.59	1.89	1.99	2.13	45.04	39.49	26.11	2.57	1.75	6.32	1.61	3.78	30	30	[redacted]

TABLE 39

[redacted]

MANUFACTURER	N	MEAN MILES (M)	HYDROCARBONS (GRAMS/MILE) ARITHMETIC MEAN	HYDROCARBONS (GRAMS/MILE) ARITHMETIC SD	HYDROCARBONS (GRAMS/MILE) GEOMETRIC MEAN	HYDROCARBONS (GRAMS/MILE) GEOMETRIC SD	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC MEAN	CARBON MONOXIDE (GRAMS/MILE) ARITHMETIC SD	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC MEAN	CARBON MONOXIDE (GRAMS/MILE) GEOMETRIC SD	NOX (GRAMS/MILE) ARITHMETIC MEAN	NOX (GRAMS/MILE) ARITHMETIC SD	NOX (GRAMS/MILE) GEOMETRIC MEAN	NOX (GRAMS/MILE) GEOMETRIC SD	% RECALL HC (ESTIMATE)	% RECALL CO (ESTIMATE)	% RECALL NOX (ESTIMATE)
[redacted]	3	7.0	0.00	0.00	0.00	1.00	0.00	7.00	0.00	2.24	1.34	0.54	1.00	1.31	[redacted]	[redacted]	[redacted]
[redacted]	4	10.0	1.10	0.00	0.70	1.54	20.47	29.75	10.00	3.61	2.29	1.78	1.90	1.89	75	75	50
[redacted]	1	13.2	0.07	0.00	0.07	0.00	0.07	0.00	0.07	0.00	3.30	0.00	3.30	0.00	[redacted]	[redacted]	40
[redacted]	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
[redacted]	0	0.0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0	0
[redacted]	10	9.2	0.75	0.50	0.64	1.61	12.91	18.56	7.33	2.58	2.12	[redacted]	1.93	1.98	50	50	[redacted]

TABLE 40

EMISSION RESULTS FOR 1975 VEHICLES IN RESPONSE TO QUESTION CONCERNING USE OF LEADED FUEL — 1975 FTP

Response	N	HC GM/MI Mean	HC GM/MI SD	CO GM/MI Mean	CO GM/MI SD	NOX GM/MI Mean	NOX GM/MI SD	FUEL ECONOMY MPG Mean	FUEL ECONOMY MPG SD	IDLE HC PPM Mean	IDLE HC PPM SD	IDLE CO % Mean	IDLE CO % SD
Not Required	93	1.58	0.92	20.54	17.50	2.43	1.01	17.44	5.27	132	118	1.46	1.50
Never	503	1.27	1.06	21.00	24.74	2.39	1.02	12.92	2.71	139	174	1.23	2.06
Once or Twice	11	1.54	0.95	25.87	28.28	2.50	0.96	14.63	4.83	136	122	1.48	2.19
Occasionally	5	1.36	0.73	35.00	35.16	1.95	1.09	13.39	5.19	65	47	1.58	2.53
Regularly	71	1.63	1.58	30.38	30.25	2.40	1.01	12.65	2.48	154	248	2.11	2.75
Don't Know	35	1.18	0.97	17.53	17.54	2.11	0.96	13.25	2.66	79	88	0.74	1.23

Question: If the vehicle requires unleaded fuel, has it been operated on leaded fuel?

TABLE 41

EMISSION RESULTS FOR 1975 VEHICLES IN RESPONSE TO QUESTION CONCERNING HYDROGEN SULFIDE ODOR — 1975 FTP

Response	N	HC GM/MI Mean	HC GM/MI SD	CO GM/MI Mean	CO GM/MI SD	NOX GM/MI Mean	NOX GM/MI SD	FUEL ECONOMY MPG Mean	FUEL ECONOMY MPG SD	IDLE HC PPM Mean	IDLE HC PPM SD	IDLE CO % Mean	IDLE CO % SD
Never	451	1.23	0.96	19.01	20.62	2.49	1.05	13.71	3.42	110	158	1.00	1.72
Rarely	22	1.43	0.96	26.05	21.30	2.12	0.59	11.78	2.04	132	151	1.48	2.57
Occasionally	82	1.52	1.25	30.71	26.89	2.36	1.16	12.97	2.60	124	121	1.83	2.47
Regularly	67	2.00	1.19	45.28	31.19	2.05	0.84	12.63	2.52	172	120	3.11	2.81
Don't Know	104	1.31	1.38	21.13	23.99	2.22	0.85	13.22	3.09	139	273	1.16	1.96

Question: Have you or others noticed a hydrogen sulfide (rotten eggs) odor in this vehicles' exhaust?

TABLE 42

1975 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR CHICAGO

			1975	1975 LDT	TOTAL
HYDROCARBONS TGM/MI	ARITHMETIC	MEAN	0.36	0.41	0.38
		SD	0.26	0.32	0.28
	GEOMETRIC	MEAN	0.31	0.35	0.33
		SD	1.91	1.93	1.92
CARBON MONOXIDE TGM/MI	ARITHMETIC	MEAN	7.19	8.08	8.02
		SD	10.48	3.92	9.05
	GEOMETRIC	MEAN	3.08	3.62	3.71
		SD	3.91	83.96	10.94
CARBON DIOXIDE TGM/MI	ARITHMETIC	MEAN	909.00	949.06	922.00
		SD	117.69	45.99	110.71
	GEOMETRIC	MEAN	897.65	940.88	907.01
		SD	1.13	1.06	1.11
NOX TGM/MI	ARITHMETIC	MEAN	0.78	0.88	0.80
		SD	1.09	0.87	1.14
	GEOMETRIC	MEAN	0.68	0.81	0.84
		SD	1.90	1.81	1.83
FUEL ECONOMY (MPG)		MEAN	10.92	10.12	10.91
		SD	0.76	1.08	0.16

TABLE 43

1975 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR HOUSTON

			1975	1975 LDT	TOTAL
HYDROCARBONS TGM/MI	ARITHMETIC	MEAN	0.38	0.38	0.38
		SD	0.29	0.38	0.31
	GEOMETRIC	MEAN	0.40	0.43	0.41
		SD	1.91	1.89	1.90
CARBON MONOXIDE TGM/MI	ARITHMETIC	MEAN	8.68	8.10	8.43
		SD	10.68	5.17	10.07
	GEOMETRIC	MEAN	4.71	4.68	4.93
		SD	4.96	18.77	4.88
CARBON DIOXIDE TGM/MI	ARITHMETIC	MEAN	908.96	931.10	900.71
		SD	115.44	87.92	111.41
	GEOMETRIC	MEAN	897.93	930.03	900.81
		SD	1.12	1.10	1.10
NOX TGM/MI	ARITHMETIC	MEAN	0.96	0.98	0.96
		SD	1.06	1.04	1.05
	GEOMETRIC	MEAN	0.77	0.91	0.82
		SD	1.96	1.89	1.86
FUEL ECONOMY (MPG)		MEAN	10.78	10.16	10.14
		SD	0.63	0.96	0.80

TABLE 44

1975 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR PHOENIX

			1975	1975 LDT	TOTAL
HYDROCARBONS (GM/MI)	ARITHMETIC	MEAN	0.38	0.51	0.41
		SD	0.48	0.70	0.50
	GEOMETRIC	MEAN	0.24	0.31	0.23
		SD	2.07	2.28	2.09
CARBON MONOXIDE (GM/MI)	ARITHMETIC	MEAN	7.08	9.28	7.15
		SD	10.78	8.67	10.53
	GEOMETRIC	MEAN	4.78	8.94	4.18
		SD	3.47	3.79	3.33
CARBON DIOXIDE (GM/MI)	ARITHMETIC	MEAN	405.59	499.00	408.10
		SD	107.68	92.88	108.91
	GEOMETRIC	MEAN	419.76	499.14	408.06
		SD	1.30	1.11	1.29
NOX (GM/MI)	ARITHMETIC	MEAN	2.09	3.16	2.06
		SD	1.84	0.78	1.89
	GEOMETRIC	MEAN	2.08	3.08	2.08
		SD	1.91	1.26	1.74
FUEL ECONOMY (MPG)		MEAN	19.80	17.80	19.67
		SD	4.74	4.79	4.80

TABLE 45

1975 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR ST. LOUIS

			1975	1975 LDT	TOTAL
HYDROCARBONS (GM/MI)	ARITHMETIC	MEAN	0.31	0.47	
		SD	0.82	0.50	14
	GEOMETRIC	MEAN	0.20	0.18	0.19
		SD	2.06	2.07	2.07
CARBON MONOXIDE (GM/MI)	ARITHMETIC	MEAN	8.09	1.97	8.01
		SD	7.78	1.91	8.01
	GEOMETRIC	MEAN	1.00	0.79	1.10
		SD	4.17	4.01	4.00
CARBON DIOXIDE (GM/MI)	ARITHMETIC	MEAN	438.18	485.02	440.17
		SD	109.16	94.66	98.90
	GEOMETRIC	MEAN	415.68	481.91	449.16
		SD	1.31	1.07	1.28
NOX (GM/MI)	ARITHMETIC	MEAN	2.78	2.74	2.78
		SD	1.86	1.98	1.86
	GEOMETRIC	MEAN	1.68	2.05	2.15
		SD	1.86	1.87	1.82
FUEL ECONOMY (MPG)		MEAN	20.38	18.18	19.85
		SD	5.01	1.20	4.84

TABLE 46

EPA EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR WASHINGTON

			1978	1975 LDT	TOTAL
HYDROCARBONS TGM/MIT	ARITHMETIC	MEAN	0.87	0.00	0.44
		SD	0.51	0.78	0.66
	GEOMETRIC	MEAN	0.41	0.09	0.00
		SD	2.76	0.82	3.58
CARBON MONOXIDE TGM/MIT	ARITHMETIC	MEAN	5.91	0.59	5.00
		SD	7.47	2.87	6.78
	GEOMETRIC	MEAN	0.19	0.00	1.72
		SD	3.00	0.00	4.69
CARBON DIOXIDE TGM/MIT	ARITHMETIC	MEAN	508.11	600.23	579.69
		SD	118.80	68.18	107.81
	GEOMETRIC	MEAN	491.77	810.00	488.81
		SD	1.02	1.00	1.20
NOX TGM/MIT	ARITHMETIC	MEAN	3.09	0.00	0.00
		SD	2.01	1.32	1.91
	GEOMETRIC	MEAN	2.10	0.58	0.51
		SD	1.78	1.36	1.70
FUEL ECONOMY (MPG)		MEAN	19.01	19.87	19.12
		SD	4.07	1.38	4.06

TABLE 47

EPA EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR ALL CITIES EXCEPT LOS ANGELES AND DENVER

			1978	1975 LDT	TOTAL
HYDROCARBONS TGM/MIT	ARITHMETIC	MEAN	0.33	0.51	0.40
		SD	0.38	0.66	0.62
	GEOMETRIC	MEAN	0.21	0.19	0.01
		SD	2.60	3.00	2.77
CARBON MONOXIDE TGM/MIT	ARITHMETIC	MEAN	0.00	1.21	0.00
		SD	10.36	0.44	0.00
	GEOMETRIC	MEAN	0.10	0.71	1.00
		SD	0.36	11.10	0.77
CARBON DIOXIDE TGM/MIT	ARITHMETIC	MEAN	491.70	517.51	500.00
		SD	110.00	00.17	100.00
	GEOMETRIC	MEAN	485.00	515.10	492.00
		SD	1.02	1.10	1.00
NOX TGM/MIT	ARITHMETIC	MEAN	0.10	0.10	0.10
		SD	1.00	1.00	1.00
	GEOMETRIC	MEAN	0.71	0.00	0.75
		SD	1.76	1.07	1.72
FUEL ECONOMY (MPG)		MEAN	19.01	19.70	19.00
		SD	4.10	1.00	4.00

TABLE 48

FY75 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR DENVER

			1975	1975 LDT	TOTAL
HYDROCARBONS TGM/MI	ARITHMETIC	MEAN	1.08	0.66	0.78
		SD	0.92	0.46	0.68
	GEOMETRIC	MEAN	0.78	0.51	0.67
		SD	0.48	0.31	0.39
CARBON MONOXIDE TGM/MI	ARITHMETIC	MEAN	23.78	13.78	20.03
		SD	29.00	13.01	27.02
	GEOMETRIC	MEAN	13.02	8.20	10.09
		SD	2.70	1.81	2.81
CARBON DIOXIDE TGM/MI	ARITHMETIC	MEAN	726.88	469.78	617.70
		SD	187.24	66.88	186.49
	GEOMETRIC	MEAN	687.81	467.06	605.90
		SD	1.24	1.18	1.22
NOX TGM/MI	ARITHMETIC	MEAN	1.22	0.74	0.98
		SD	0.93	1.24	1.06
	GEOMETRIC	MEAN	1.00	0.86	1.00
		SD	1.86	1.82	1.82
FUEL ECONOMY (MPG)		MEAN	15.00	17.87	15.19
		SD	3.19	1.44	4.00

TABLE 49

FY75 EMISSION FACTOR PROGRAM
HIGHWAY FUEL ECONOMY TEST FOR LOS ANGELES

			1975	1975 LDT	TOTAL
HYDROCARBONS TGM/MI	ARITHMETIC	MEAN	0.11	0.09	0.10
		SD	0.14	0.06	0.07
	GEOMETRIC	MEAN	0.07	0.10	0.08
		SD	2.08	2.76	2.00
CARBON MONOXIDE TGM/MI	ARITHMETIC	MEAN	1.79	0.57	1.01
		SD	4.68	19.00	8.30
	GEOMETRIC	MEAN	0.65	0.26	0.49
		SD	10.30	17.61	11.92
CARBON DIOXIDE TGM/MI	ARITHMETIC	MEAN	491.07	303.70	399.05
		SD	188.47	71.65	122.19
	GEOMETRIC	MEAN	470.87	329.13	405.99
		SD	1.34	1.16	1.31
NOX TGM/MI	ARITHMETIC	MEAN	2.00	2.03	2.15
		SD	1.68	1.10	1.66
	GEOMETRIC	MEAN	2.04	2.11	2.09
		SD	1.85	1.80	1.88
FUEL ECONOMY (MPG)		MEAN	17.98	19.33	17.99
		SD	4.77	1.68	4.17

TABLE 50

COMPARISON OF HIGHWAY FUEL ECONOMY
WITH 1975 FTP FUEL ECONOMY

Location	Average Highway Fuel Economy	Average 1975 FTP[1] Fuel Economy	Ratio
Chicago	18.63	13.04	1.43
Houston	19.78	14.96	1.45
Phoenix	19.80	13.93	1.42
St. Louis	20.38	14.07	1.45
Washington	18.61	17.51	1.38
5 City Composite	19.21	13.49	1.42
Denver	19.60	14.45	1.36
Los Angeles	17.95	12.76	1.41

TABLE 51

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE 52

[illegible]

[illegible]												

TABLE 54

[illegible]

[illegible]											

TABLE 15

[illegible]

[illegible]

[illegible]

TABLE 5

TABLE 57

[illegible]

[illegible]

TABLE 58

[illegible] EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR LOS ANGELES

[illegible] AND LOW SPEED DRIVING CYCLES FOR [illegible] MODEL YEAR VEHICLES

	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	

[illegible] AND LOW SPEED DRIVING CYCLES FOR [illegible] MODEL YEAR VEHICLES

	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	

TABLE 59

RATIOS OF AVERAGE HIGH SPEED WEIGHTING TO AVERAGE FTP RESULTS*

Location	HC	CO	NOX	F.E.
5 City Composite				
72 High Speed Weighting / 72 FTP	0.69	0.57	1.26	1.32
75 High Speed Weighting / 75 FTP	0.57	0.55	1.15	1.26
Denver				
72 High Speed Weighting / 72 FTP	0.70	0.61	1.42	1.38
75 High Speed Weighting / 75 FTP	0.66	0.74	1.21	1.21
Los Angeles				
72 High Speed Weighting / 72 FTP	0.63	0.59	1.34	1.34
75 High Speed Weighting / 75 FTP	0.63	0.53	1.18	1.29

* The average speed of the FTP is 19.6 mph, the average speed of the High Speed Cycle is 35.0 mph.

TABLE 60

RATIOS OF AVERAGE LOW SPEED WEIGHTING TO AVERAGE FTP RESULTS*

Location	HC	CO	NOX	F.E.
5 City Composite				
72 Low Speed Weighting / 72 FTP	1.52	1.62	0.93	0.75
75 Low Speed Weighting / 75 FTP	1.71	1.62	0.89	0.77
Denver				
72 Low Speed Weighting / 72 FTP	1.44	1.46	0.91	0.77
75 Low Speed Weighting / 75 FTP	1.44	1.17	0.96	0.80
Los Angeles				
72 Low Speed Weighting / 72 FTP	1.58	1.59	0.96	0.74
75 Low Speed Weighting / 75 FTP	1.79	1.13	0.96	0.79

*The average speed of the FTP is 19.0 mph, the average speed of the Low Speed Cycle is 11.8 mph.

TABLE 11

ACCELERATION/DECELERATION MODES OF SURFACE/SUBSURFACE SERVICE SERIES

TABLE 64

Modal Emissions For Low Altitudes, Non-California 1975 Autos

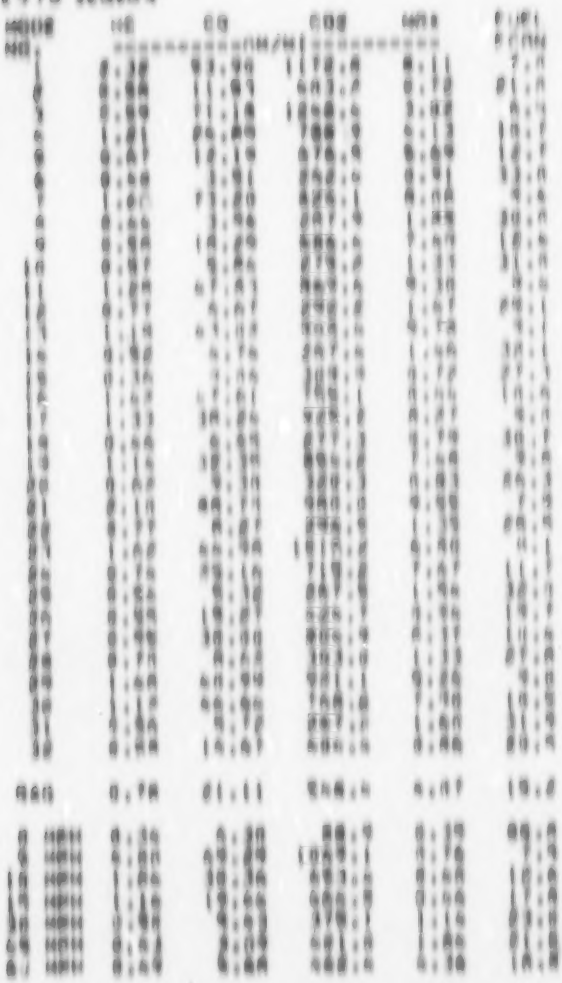
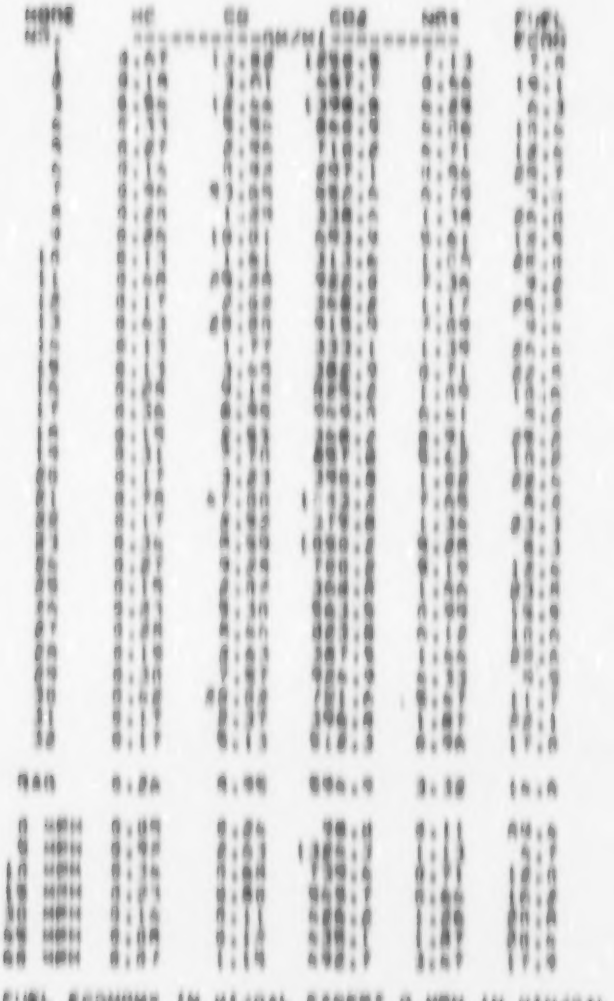


TABLE 63

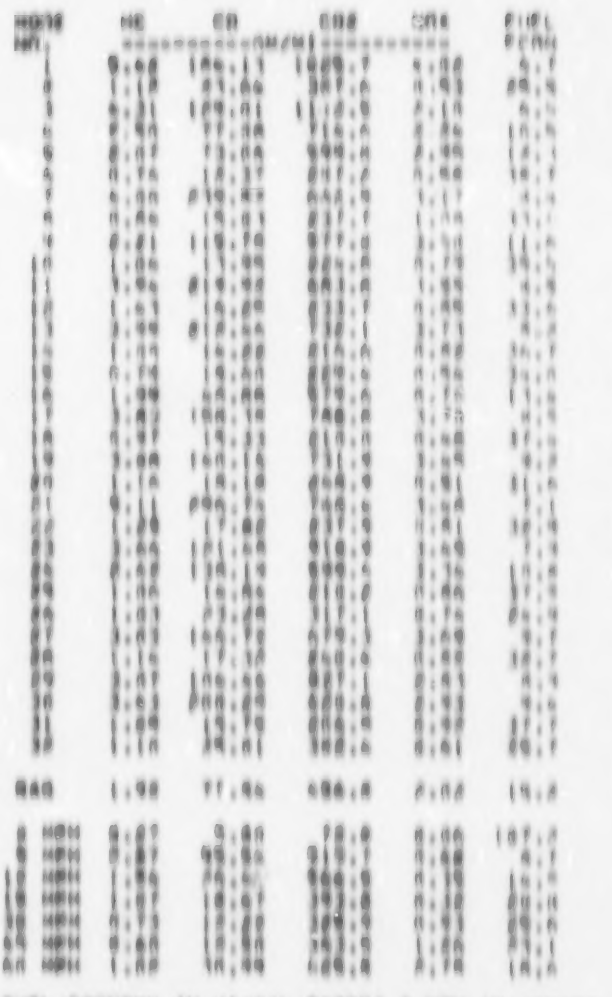
Modal Emissions For Los Angeles 1975 Autos



FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 64

Modal Emissions For Denver 1975 Autos



FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 65

Modal Emissions For Low Altitude, Non-California 1975 Light Duty Trucks

MODE (MPH)	HC	CO	CO2	NOX	FUEL (MI/GAL)
		(GM/MI)			
1	0.00	39.12	1209.3	7.47	6.9
2	1.19	7.31	496.6	0.56	18.8
3	0.87	42.96	1301.0	3.88	6.1
4	1.09	15.22	864.7	6.06	10.0
5	0.61	9.15	709.9	0.98	12.8
6	0.86	2.09	513.4	0.95	17.6
7	1.19	36.86	918.3	9.16	9.1
8	0.76	2.63	561.6	1.08	16.5
9	0.96	6.96	703.1	0.67	13.6
10	1.13	3.09	613.6	1.38	15.6
11	0.00	0.87	511.2	10.66	9.8
12	1.13	3.89	636.5	1.13	15.5
13	0.98	17.60	959.3	10.76	9.6
14	0.98	2.71	616.6	1.63	14.6
15	0.86	0.98	560.6	0.61	17.6
16	0.81	27.06	867.1	8.83	9.8
17	1.18	26.78	994.1	8.73	8.6
18	1.00	3.02	728.5	0.77	15.3
19	0.90	19.06	855.3	0.68	9.6
20	1.08	6.38	776.6	0.78	13.3
21	1.06	63.96	1355.6	10.98	7.2
22	1.38	5.08	776.3	1.36	13.6
23	1.82	29.69	1098.2	8.38	7.8
24	0.85	0.86	788.0	0.38	11.8
25	0.91	2.69	811.6	1.08	13.8
26	1.04	8.83	885.1	0.88	12.7
27	0.76	11.15	872.6	0.15	9.9
28	1.07	6.58	848.2	1.33	13.7
29	1.38	61.05	1518.6	6.72	8.6
30	0.88	13.78	938.1	0.87	10.6
31	0.85	6.19	893.6	1.66	13.5
32	1.11	0.39	666.8	0.78	14.3
AVG	0.94	10.16	816.3	0.88	14.0
0 MPH	0.00	3.38	98.9	0.26	99.0
0 MPH	0.81	37.98	1188.8	0.66	7.6
0 MPH	0.96	18.61	602.6	0.55	10.1
0 MPH	1.03	11.87	997.5	0.00	10.0
0 MPH	0.80	3.31	649.3	1.06	13.6
0 MPH	0.35	1.66	665.3	0.11	13.0
0 MPH	0.84	0.87	622.1	0.09	14.1

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 66

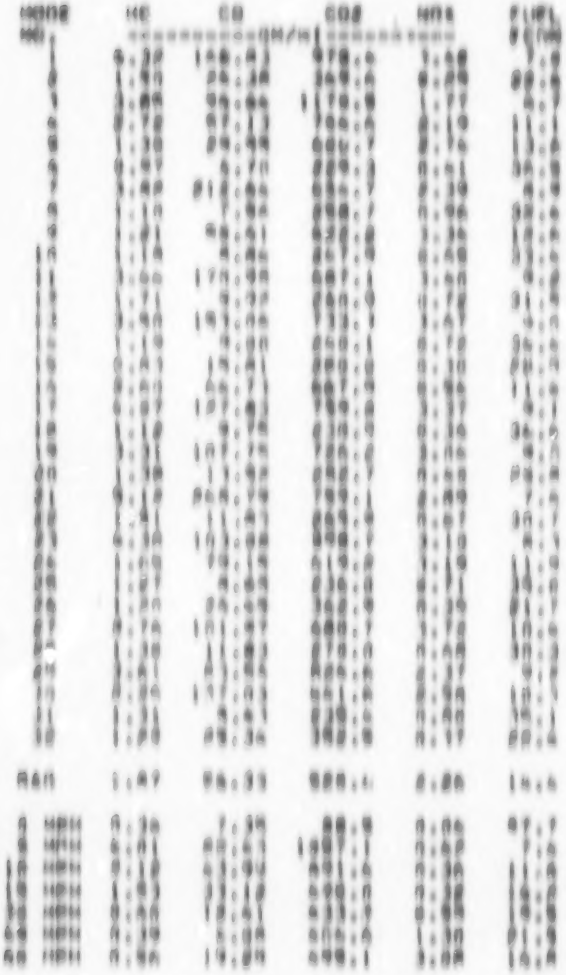
Modal Emissions For Los Angeles 1975 Light Duty Trucks

MODE (MPH)	HC	CO	CO2	NOX	FUEL (MI/GAL)
		(GM/MI)			
1	1.05	39.01	1168.8	6.05	7.3
2	0.60	6.05	913.0	0.58	17.6
3	1.01	19.38	1219.1	3.73	8.6
4	0.63	13.06	883.8	3.36	10.9
5	0.90	16.00	885.1	3.66	12.9
6	0.71	1.96	788.8	0.73	15.3
7	0.92	39.00	881.1	8.60	9.4
8	0.68	2.71	636.6	1.25	21.9
9	0.88	15.38	791.7	0.78	13.2
10	0.93	2.00	788.8	0.97	13.6
11	0.86	36.00	889.9	8.03	9.3
12	0.72	3.02	616.7	1.12	20.4
13	0.89	38.68	898.8	8.88	9.9
14	0.92	2.88	661.1	1.07	21.0
15	0.80	2.69	626.8	0.87	16.7
16	0.83	4.86	863.6	1.04	9.3
17	0.86	38.83	898.6	8.88	9.3
18	0.80	2.76	710.6	1.03	21.3
19	0.88	20.68	753.8	0.87	11.6
20	0.72	3.35	663.8	0.89	16.4
21	1.25	59.18	988.8	9.83	8.6
22	0.84	3.83	687.7	1.28	19.1
23	0.87	28.73	1008.7	6.88	8.9
24	0.67	17.37	738.8	0.11	11.7
25	0.85	3.88	668.6	1.08	18.6
26	0.35	5.88	688.9	1.04	13.9
27	0.66	25.89	798.1	0.91	10.6
28	0.88	6.38	668.8	1.36	16.7
29	0.67	19.68	893.7	1.88	9.6
30	0.86	38.36	888.3	0.88	10.1
31	0.98	8.78	698.6	1.82	17.8
32	0.36	8.87	848.6	0.98	14.3
AVG	0.89	13.18	888.7	2.88	13.8
0 MPH	0.12	1.88	39.8	0.18	99.8
0 MPH	0.33	14.76	1861.6	1.38	5.8
0 MPH	0.88	8.88	715.2	0.87	12.4
0 MPH	0.37	8.81	838.8	0.78	13.8
0 MPH	0.19	8.28	868.8	1.19	17.5
0 MPH	0.88	3.88	575.3	1.76	18.9
0 MPH	0.88	8.84	848.8	3.88	14.8

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 67

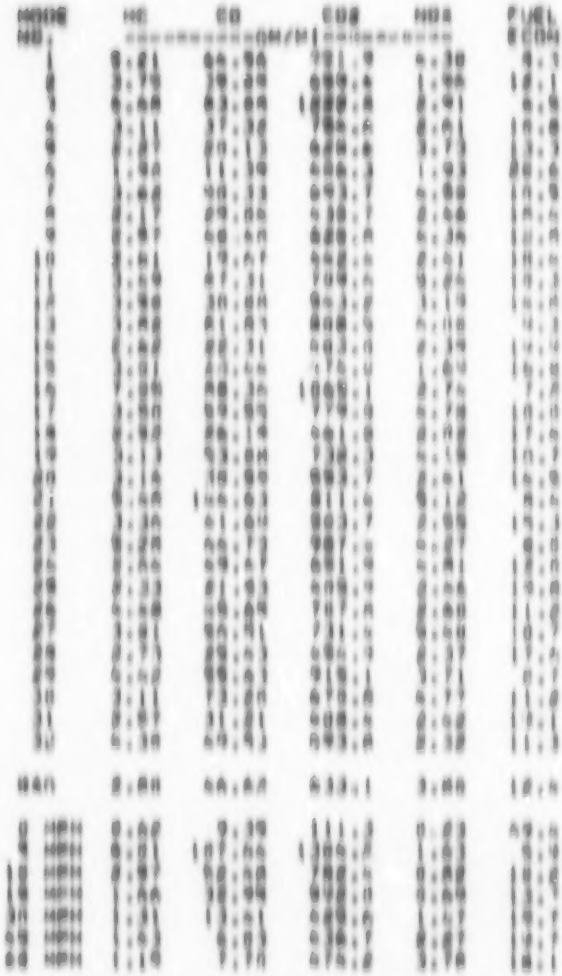
Modal Emissions For Denver
1975 Light Duty Trucks



FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 68

Modal Emissions For Low Altitude
Non-California 1974 Autos



FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 69

Modal Emissions For Denver
1974 Autos

MPH	HC	CO	CO2	NOx	FUEL ECON
	GM/MI				
0	0.00	110.01	0.0	1.07	0.0
5	0.00	133.74	0.0	1.11	0.0
10	0.00	162.00	0.0	1.46	0.0
15	0.00	110.03	0.0	1.53	0.0
20	0.00	89.80	0.0	0.00	0.0
25	0.00	83.00	0.0	0.91	0.0
30	0.00	144.50	0.0	0.96	0.0
35	0.00	98.00	0.0	0.00	0.0
40	0.00	109.00	0.0	0.00	0.0
45	0.00	78.33	0.0	0.00	0.0
50	0.00	93.10	0.0	0.00	0.0
55	0.00	114.43	0.0	0.00	0.0
60	0.00	891.19	0.0	0.00	0.0
65	0.00	90.00	0.0	0.00	0.0
70	0.00	81.67	0.0	0.00	0.0
75	12.59	178.00	0.0	0.00	0.0
80	0.00	161.00	0.0	0.00	0.0
85	0.00	116.67	0.0	0.00	0.0
90	0.00	100.00	0.0	0.00	0.0
95	0.00	108.33	0.0	0.00	0.0
100	0.00	130.00	0.0	0.00	0.0
105	0.00	0.00	0.0	0.00	0.0
110	0.00	0.00	0.0	0.00	0.0
115	0.00	0.00	0.0	0.00	0.0
120	0.00	0.00	0.0	0.00	0.0
125	0.00	0.00	0.0	0.00	0.0
130	0.00	0.00	0.0	0.00	0.0
135	0.00	0.00	0.0	0.00	0.0
140	0.00	0.00	0.0	0.00	0.0
145	0.00	0.00	0.0	0.00	0.0
150	0.00	0.00	0.0	0.00	0.0
155	0.00	0.00	0.0	0.00	0.0
160	0.00	0.00	0.0	0.00	0.0
165	0.00	0.00	0.0	0.00	0.0
170	0.00	0.00	0.0	0.00	0.0
175	0.00	0.00	0.0	0.00	0.0
180	0.00	0.00	0.0	0.00	0.0
185	0.00	0.00	0.0	0.00	0.0
190	0.00	0.00	0.0	0.00	0.0
195	0.00	0.00	0.0	0.00	0.0
200	0.00	0.00	0.0	0.00	0.0
GAS	0.83	138.71	481.9	1.98	18.4
0 MPH	1.00	15.07	88.9	0.12	77.8
5 MPH	10.16	1581.01	1079.1	0.78	5.6
10 MPH	5.58	79.25	885.8	0.60	18.2
15 MPH	0.85	99.10	670.5	0.66	18.6
20 MPH	1.87	38.61	380.8	0.19	21.6
25 MPH	1.98	33.61	380.8	0.17	19.1
30 MPH	2.18	47.88	439.4	0.00	17.0

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 70

Modal Emissions For Los Angeles
1974 Autos

MPH	HC	CO	CO2	NOx	FUEL ECON
	GM/MI				
0	0.00	90.19	1074.5	0.00	0.0
5	0.00	18.37	500.5	0.74	17.1
10	0.00	161.43	1383.1	0.74	0.0
15	0.00	38.03	969.7	0.00	0.0
20	0.00	0.00	788.5	0.00	0.0
25	1.83	0.00	879.5	0.97	30.0
30	0.00	14.07	988.7	0.00	0.0
35	1.46	0.00	896.6	1.09	30.0
40	0.00	0.00	788.3	0.00	0.0
45	0.00	7.00	848.9	0.00	0.0
50	0.00	0.00	848.9	0.00	0.0
55	1.36	0.00	988.9	1.00	0.0
60	1.81	18.81	879.1	1.08	0.0
65	0.00	7.00	1000.0	1.38	0.0
70	0.00	0.00	888.0	0.00	0.0
75	1.00	0.00	919.8	0.87	0.0
80	0.00	0.00	940.9	0.00	0.0
85	0.00	0.00	940.9	0.00	0.0
90	0.00	0.00	940.9	0.00	0.0
95	0.00	0.00	940.9	0.00	0.0
100	0.00	0.00	940.9	0.00	0.0
105	0.00	0.00	940.9	0.00	0.0
110	0.00	0.00	940.9	0.00	0.0
115	0.00	0.00	940.9	0.00	0.0
120	0.00	0.00	940.9	0.00	0.0
125	0.00	0.00	940.9	0.00	0.0
130	0.00	0.00	940.9	0.00	0.0
135	0.00	0.00	940.9	0.00	0.0
140	0.00	0.00	940.9	0.00	0.0
145	0.00	0.00	940.9	0.00	0.0
150	0.00	0.00	940.9	0.00	0.0
155	0.00	0.00	940.9	0.00	0.0
160	0.00	0.00	940.9	0.00	0.0
165	0.00	0.00	940.9	0.00	0.0
170	0.00	0.00	940.9	0.00	0.0
175	0.00	0.00	940.9	0.00	0.0
180	0.00	0.00	940.9	0.00	0.0
185	0.00	0.00	940.9	0.00	0.0
190	0.00	0.00	940.9	0.00	0.0
195	0.00	0.00	940.9	0.00	0.0
200	0.00	0.00	940.9	0.00	0.0
GAS	0.29	30.94	888.9	0.97	18.9
0 MPH	0.00	0.00	112.0	0.00	71.7
5 MPH	0.33	21.69	1368.7	1.07	0.0
10 MPH	1.02	21.00	889.9	0.00	18.1
15 MPH	1.05	18.04	889.1	0.53	18.0
20 MPH	1.16	0.76	851.7	0.00	18.9
25 MPH	0.00	9.63	888.9	1.00	18.0
30 MPH	0.00	7.00	879.3	0.81	18.0

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 71

Modal Emissions For Low Altitude, Non-California 1973 Autos

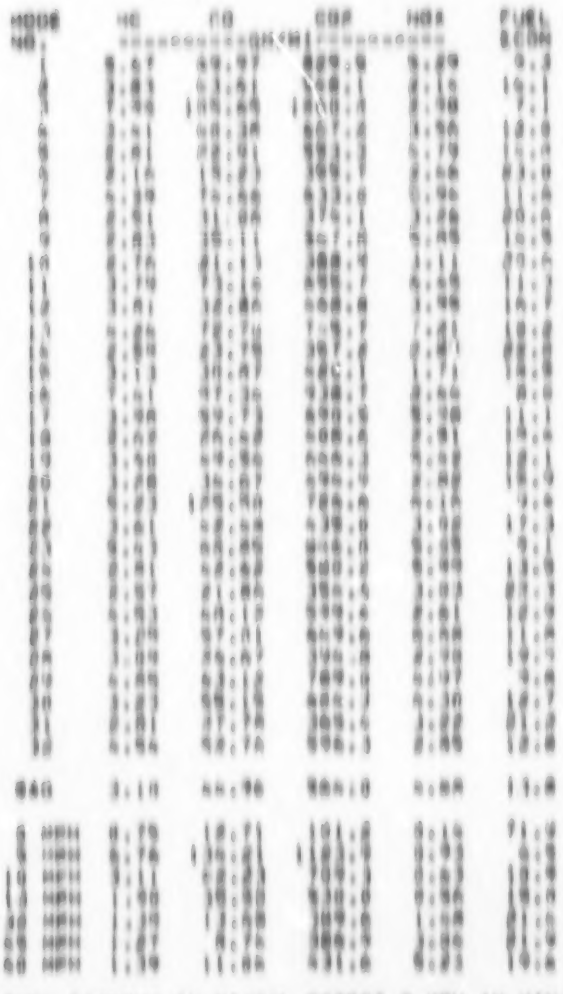


TABLE 72

Modal Emissions For Denver 1973 Autos

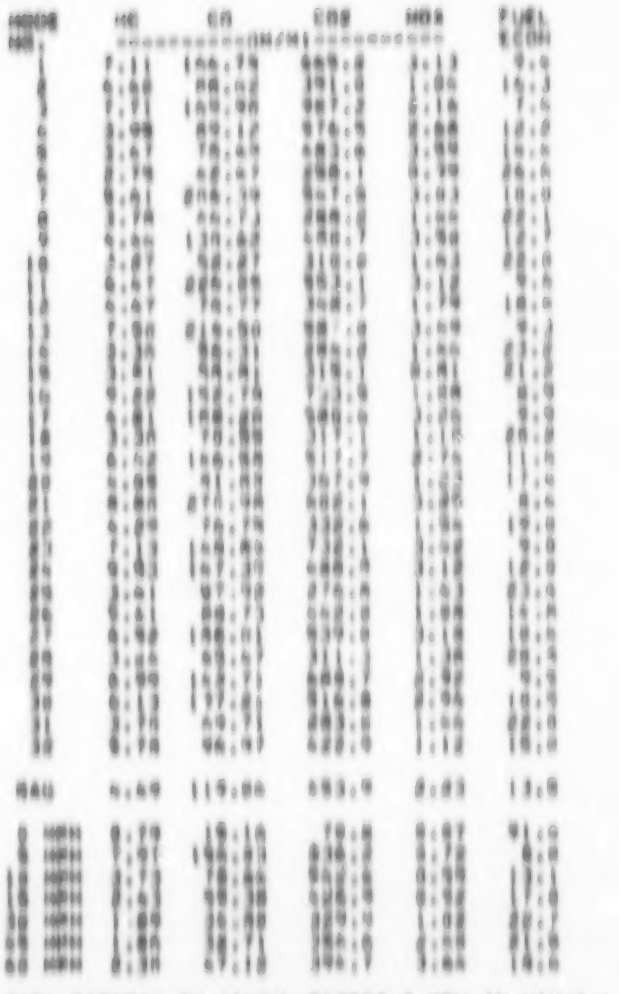


TABLE 73

Modal Emissions For
Los Angeles 1973 Autos

MODE NO.	HC	CO	CO2	NOX	FUEL ECON
	GM/M				
1	7.80	95.11	1386.9	10.98	9.8
2	6.64	85.96	603.1	1.08	19.7
3	6.11	106.48	1291.6	6.12	8.1
4	3.75	30.96	838.9	9.82	9.7
5	2.93	21.78	666.5	6.78	12.3
6	2.17	8.81	720.2	1.33	10.8
7	5.68	119.98	858.5	9.28	8.1
8	2.67	8.92	212.1	2.05	34.6
9	3.66	37.77	676.8	6.68	11.9
10	3.09	11.63	833.5	1.51	11.1
11	6.80	61.31	866.6	9.12	9.1
12	6.09	13.61	848.8	8.18	11.4
13	6.86	67.16	879.9	10.06	8.9
14	2.67	9.83	188.9	1.19	48.3
15	1.89	17.91	262.9	0.86	36.8
16	6.67	60.86	827.3	8.93	12.8
17	9.16	67.96	936.8	10.17	8.5
18	2.35	13.22	218.1	1.87	36.8
19	4.31	56.85	857.9	9.68	9.2
20	2.68	16.38	298.6	1.89	29.3
21	7.10	105.56	977.3	10.11	7.8
22	2.32	15.77	288.7	1.66	30.6
23	6.46	62.85	1000.9	9.66	7.6
24	3.17	25.30	718.6	6.89	11.2
25	2.68	19.85	216.6	1.83	33.0
26	3.00	33.85	521.8	1.36	18.5
27	6.66	61.68	803.8	10.08	10.0
28	2.36	15.61	230.6	1.66	32.8
29	6.76	62.19	966.8	1.69	8.3
30	3.19	28.91	788.8	9.31	10.8
31	6.83	19.91	198.9	1.88	68.5
32	3.36	34.74	428.6	1.38	18.8
MAG	3.81	38.89	548.9	6.38	19.8
0 MPH	0.00	0.00	93.6	0.07	81.5
5 MPH	7.11	73.91	1198.3	1.08	6.6
10 MPH	3.11	26.79	713.6	0.73	11.5
15 MPH	1.61	20.65	542.8	0.69	16.1
20 MPH	1.35	9.05	386.7	1.08	21.5
25 MPH	1.30	5.06	393.1	0.58	21.9
30 MPH	1.83	4.87	431.8	0.38	19.9

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MI/HR

TABLE 74

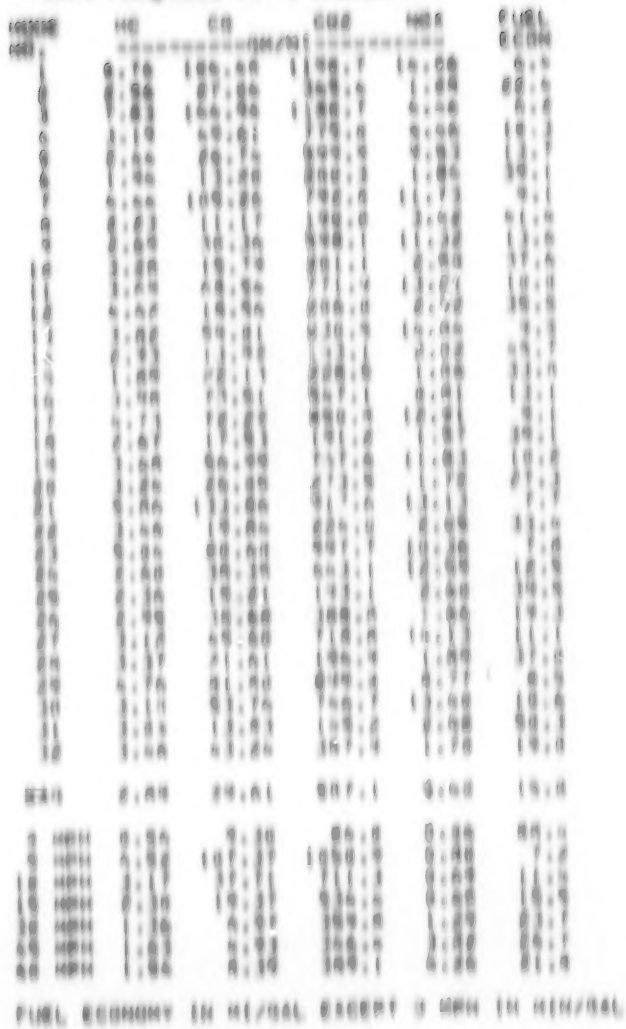
Modal Emissions For Low
Altitude, Non-California 1973 Autos

MODE NO.	HC	CO	CO2	NOX	FUEL ECON
	GM/M				
1	9.66	78.08	888.3	7.01	9.6
2	6.31	68.67	618.5	2.15	14.5
3	6.18	121.66	996.7	6.19	7.3
4	3.79	66.78	666.3	6.03	10.1
5	2.75	25.86	591.3	6.99	14.5
6	2.06	18.05	346.1	1.17	23.6
7	3.68	69.12	619.6	7.36	10.3
8	2.56	16.02	253.9	2.18	21.2
9	3.91	31.64	636.6	7.66	14.9
10	2.39	29.95	353.1	2.08	21.9
11	3.87	61.16	652.9	8.15	11.7
12	2.96	39.67	441.8	8.87	19.0
13	3.35	61.63	713.6	9.28	10.4
14	1.19	29.92	338.3	3.91	22.9
15	1.56	39.99	500.8	6.36	18.7
16	3.11	116.66	876.3	3.16	8.6
17	6.66	86.75	679.3	7.67	11.3
18	1.21	32.16	349.8	3.69	18.1
19	3.86	69.86	609.6	6.79	12.3
20	2.19	22.16	278.3	3.91	16.1
21	3.76	110.84	789.1	7.41	9.1
22	2.01	31.83	317.6	3.08	17.3
23	3.96	63.81	681.8	7.86	9.1
24	1.83	37.98	386.2	3.88	16.6
25	1.86	28.87	368.3	3.83	18.5
26	2.82	37.76	369.5	3.19	13.2
27	3.76	83.16	668.9	8.69	11.3
28	1.99	19.66	276.9	3.88	20.0
29	3.21	77.31	788.8	8.83	9.5
30	1.28	47.88	405.2	7.96	18.8
31	2.89	36.71	369.1	8.68	21.5
32	2.13	26.76	268.7	3.98	19.9
MAG	3.61	68.43	538.9	6.88	14.2
0 MPH	1.18	18.81	96.8	0.38	78.5
5 MPH	8.12	169.83	1369.5	1.87	5.6
10 MPH	3.98	71.16	897.7	0.79	10.8
15 MPH	2.68	61.66	619.1	0.96	15.0
20 MPH	1.86	19.31	388.8	1.95	21.7
25 MPH	1.81	14.89	376.8	0.32	22.8
30 MPH	1.84	14.89	408.8	6.48	19.8

FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MI/HR

TABLE 7b

Modal Emissions For
Los Angeles 1972 Autos



FUEL ECONOMY IN MI/GAL EXCEPT 0 MPH IN MIN/GAL

TABLE 77

Loaded Vehicle Test Results
Six 1974 Model year Automobiles

Mode	Test # 1 HC	CO	NOX	Fuel Economy	Test # 2 HC	CO	NOX	Fuel Economy	Test # 3 HC	CO	NOX	Fuel Economy
0 mph	.80	19.33	.16	68.51	.76	17.43	.15	69.41	.75	16.39	.15	71.73
5 mph	9.82	238.63	1.51	5.72	9.26	201.11	1.43	5.77	8.97	198.46	1.24	5.92
10 mph	4.72	103.42	.88	10.57	4.49	96.78	.77	10.89	4.26	91.25	.76	11.29
15 mph	3.42	67.33	.60	14.92	3.21	65.41	.57	15.08	2.89	58.49	.43	15.62
30 mph	1.79	25.88	1.26	20.65	1.63	24.91	1.08	21.06	2.14	19.11	2.71	18.83
45 mph	1.48	9.46	4.48	28.17	1.49	7.53	4.35	28.29	2.01	8.31	8.23	15.46
60 mph	1.70	9.04	7.17	16.88	1.67	8.81	7.51	16.67	2.53	38.27	13.64	11.66
SDS	3.26	37.82	6.32	13.59	3.38	42.40	6.77	13.04	8.85	79.38	8.81	10.81

Emissions in gm/mi., except idle in gm/min
Fuel Economy in mi/gal., except idle in min/gal.

TABLE 70

Loaded Vehicle Test Results
Six 1975 Model Year Automobiles

Mode	Test # 1				Test # 2				Test # 3			
	HC	CO	NOX	Fuel Economy	HC	CO	NOX	Fuel Economy	HC	CO	NOX	Fuel Economy
0 mph	.18	3.36	.88	73.23	.14	1.88	.87	76.88	.15	2.65	.87	74.43
5 mph	2.43	38.89	.67	5.99	2.81	27.75	.57	6.31	1.93	26.83	.43	6.23
10 mph	1.19	16.63	.46	10.43	1.85	10.72	.34	11.88	1.88	18.33	.38	10.43
15 mph	.82	7.11	.42	14.71	.73	9.86	.31	15.32	.63	5.46	.35	15.87
30 mph	.36	.88	1.41	19.25	.32	.79	1.31	20.75	.35	.71	1.86	17.91
45 mph	.36	1.75	1.56	18.72	.34	1.36	2.13	17.79	.22	1.42	4.64	15.48
60 mph	.13	1.73	4.99	17.86	.13	1.39	5.38	17.19	.48	20.58	5.77	10.96
2505	.49	18.43	4.31	13.69	.46	13.65	4.62	13.52	.78	41.42	5.98	10.34

Emissions in gm/test, except idle in gm/min
Fuel Economy in mi/gal., except idle in min/gal.

TABLE 79

Loaded Vehicle Test Results
Three 1975 Light Duty Trucks

Mode	Test # 1				Test # 2				Test # 3			
	HC	CO	NOX	Fuel Economy	HC	CO	NOX	Fuel Economy	HC	CO	NOX	Fuel Economy
0 mph	.40	8.61	.02	88.71	.34	7.26	.01	82.24	.33	8.16	.07	85.98
5 mph	5.03	95.24	.27	6.76	4.82	78.69	.01	6.76	4.55	78.17	.36	7.35
10 mph	2.46	53.94	.18	11.85	2.29	46.56	.07	12.07	1.95	45.82	.07	12.76
15 mph	1.34	37.56	.25	13.50	1.18	34.06	.19	13.77	.87	32.69	.22	13.68
30 mph	.14	2.68	.76	16.83	.25	1.17	.54	17.43	.12	1.76	2.23	15.89
45 mph	.19	2.17	1.12	15.98	.30	5.16	1.45	16.38	.74	13.68	2.86	13.77
60 mph	.56	12.95	2.93	14.71	.62	14.66	2.83	14.78	.98	22.42	4.68	13.49
SCS	1.35	22.95	2.73	13.67	1.44	25.36	3.17	12.26	1.35	38.31	4.32	13.45

Emissions in gm/mi, except HCs in gm/min
Fuel Economy, in mi/gal., except CNs in rmm/gal.

TABLE 50

[illegible]

[illegible]

Mode No.	FAST TEST HC	CO	NOX	Fuel Econ	SECOND TEST HC	CO	NOX	Fuel Econ	THIRD TEST HC	CO	NOX	Fuel Econ
1	[illegible]											
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
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27												
28												
29												
30												
31												
32												
SIM AVG.	1.74	33.0	813.9	6.80	19.8	1.88	37.9	827.3	6.19	18.1	1.77	36.1	776.6	6.46	18.1
SIM CALC.	1.64	33.4	804.6	6.50	19.7	1.51	36.3	816.8	5.87	19.4	1.30	36.5	780.7	7.07	19.4
IDLE	3.97	10.4	179.5	0.19	73.6	0.43	9.8	183.1	0.20	74.9	0.68	9.3	188.0	0.09	75.1
30MPH	1.33	18.9	1172.8	0.91	6.0	1.47	20.9	1208.8	0.80	6.2	1.07	101.8	1138.9	0.68	6.3
10KPH	0.83	19.6	776.0	0.96	10.7	0.87	21.5	788.8	0.66	11.2	0.69	69.6	712.6	0.69	11.1
15MPH	1.98	17.3	846.1	0.66	16.8	1.81	36.7	836.2	0.19	16.9	1.66	58.1	866.9	0.36	16.9
20MPH	0.81	11.0	661.3	1.03	19.8	0.83	11.3	671.1	1.06	20.1	0.96	9.3	687.6	0.83	17.8
25MPH	0.69	9.7	607.1	0.66	18.6	0.71	8.9	615.6	0.88	18.6	1.08	8.6	674.3	0.71	18.1
30MPH	0.84	7.8	586.8	0.68	18.4	0.24	6.9	606.9	0.89	18.4	1.38	85.8	766.9	10.78	10.1

EMISSION RESULTS IN GRAMS PER MILE (PER MINUTE FOR IDLE)
FUEL ECONOMY IN MILES PER GALLON (MINUTES PER GALLON FOR IDLE)

APPENDIX I

ADDITIONAL SUMMARY DATA FROM FY '74 EMISSION FACTOR PROGRAM

TABLE 1-1

[illegible]

TABLE I-3

[illegible]

TABLE I-5

[illegible]

YEAR	N	MEAN VELOCITY (M/S)	HYDROCARBONS (GRAMS) ARITHMETIC MEAN	HYDROCARBONS (GRAMS) ARITHMETIC SD	HYDROCARBONS (GRAMS) GEOMETRIC MEAN	HYDROCARBONS (GRAMS) GEOMETRIC SD	CARBON MONOXIDE (GRAMS) ARITHMETIC MEAN	CARBON MONOXIDE (GRAMS) ARITHMETIC SD	CARBON MONOXIDE (GRAMS) GEOMETRIC MEAN	CARBON MONOXIDE (GRAMS) GEOMETRIC SD	NOX (GRAMS) ARITHMETIC MEAN	NOX (GRAMS) ARITHMETIC SD	NOX (GRAMS) GEOMETRIC MEAN	NOX (GRAMS) GEOMETRIC SD
[illegible]														
[illegible]														
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[illegible]														
[illegible]														
[illegible]														
1972	25	47.6	24.76	47.51	13.81	2.54	1346.84	982.93	1084.76	2.35	11.47	6.86	9.51	2.24
[illegible]														
1974	38	24.7	17.87	6.91	11.15	1.76	1257.48	284.24	1224.43	1.59	9.36	4.58	7.29	1.79
1975	1117	9.6	[illegible]	5.61	[illegible]	2.45	1227.84	153.92	[illegible]	1.45	7.51	3.77	[illegible]	1.82
[illegible]														
[illegible]	10	11.1	[illegible]	6.32	3.79	2.14	67.19	95.27	11.47	45.32	5.33	1.94	5.49	1.39

TABLE I-6

[illegible]

YEAR	N	MEAN VELOCITY (M/S)	HYDROCARBONS (GRAMS) ARITHMETIC MEAN	HYDROCARBONS (GRAMS) ARITHMETIC SD	HYDROCARBONS (GRAMS) GEOMETRIC MEAN	HYDROCARBONS (GRAMS) GEOMETRIC SD	CARBON MONOXIDE (GRAMS) ARITHMETIC MEAN	CARBON MONOXIDE (GRAMS) ARITHMETIC SD	CARBON MONOXIDE (GRAMS) GEOMETRIC MEAN	CARBON MONOXIDE (GRAMS) GEOMETRIC SD	NOX (GRAMS) ARITHMETIC MEAN	NOX (GRAMS) ARITHMETIC SD	NOX (GRAMS) GEOMETRIC MEAN	NOX (GRAMS) GEOMETRIC SD
[illegible]														
[illegible]														
[illegible]														
[illegible]														
[illegible]														
[illegible]														
1972	25	47.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]														
1974	38	24.7	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
1975	1117	9.6	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]														
[illegible]	10	11.1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-7

[illegible]

[illegible]																
				[illegible]												
			[illegible]	[illegible]												
			[illegible]	[illegible]												
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-9

[illegible]

[illegible]																	

TABLE I-11

[illegible]

TABLE I-13

[illegible]

TABLE I-15

[illegible]

TABLE I-17

[illegible]

TABLE I-19

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-20

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-21

[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-23

[illegible]

			[illegible]				[illegible]				[illegible]			
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

TABLE I-24

[illegible]

			[illegible]				[illegible]				[illegible]			
		[illegible]	[illegible]		[illegible]		[illegible]		[illegible]		[illegible]		[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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TABLE I-27

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TABLE I-29

[illegible]

[illegible]			[illegible]				[illegible]				[illegible]			
		MEAN MILES	ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC	
YEAR	N	DAY	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
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TABLE I-30

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		MEAN MILES	ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC		ARITHMETIC		GEOMETRIC	
YEAR	N	DAY	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD	MEAN	SD
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TABLE I-31

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TABLE I-32

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TABLE 5-33

FY74 EMISSION FACTOR PROGRAM

EMISSION RESULTS FOR ALL CITIES EXCEPT LOS ANGELES AND DENVER

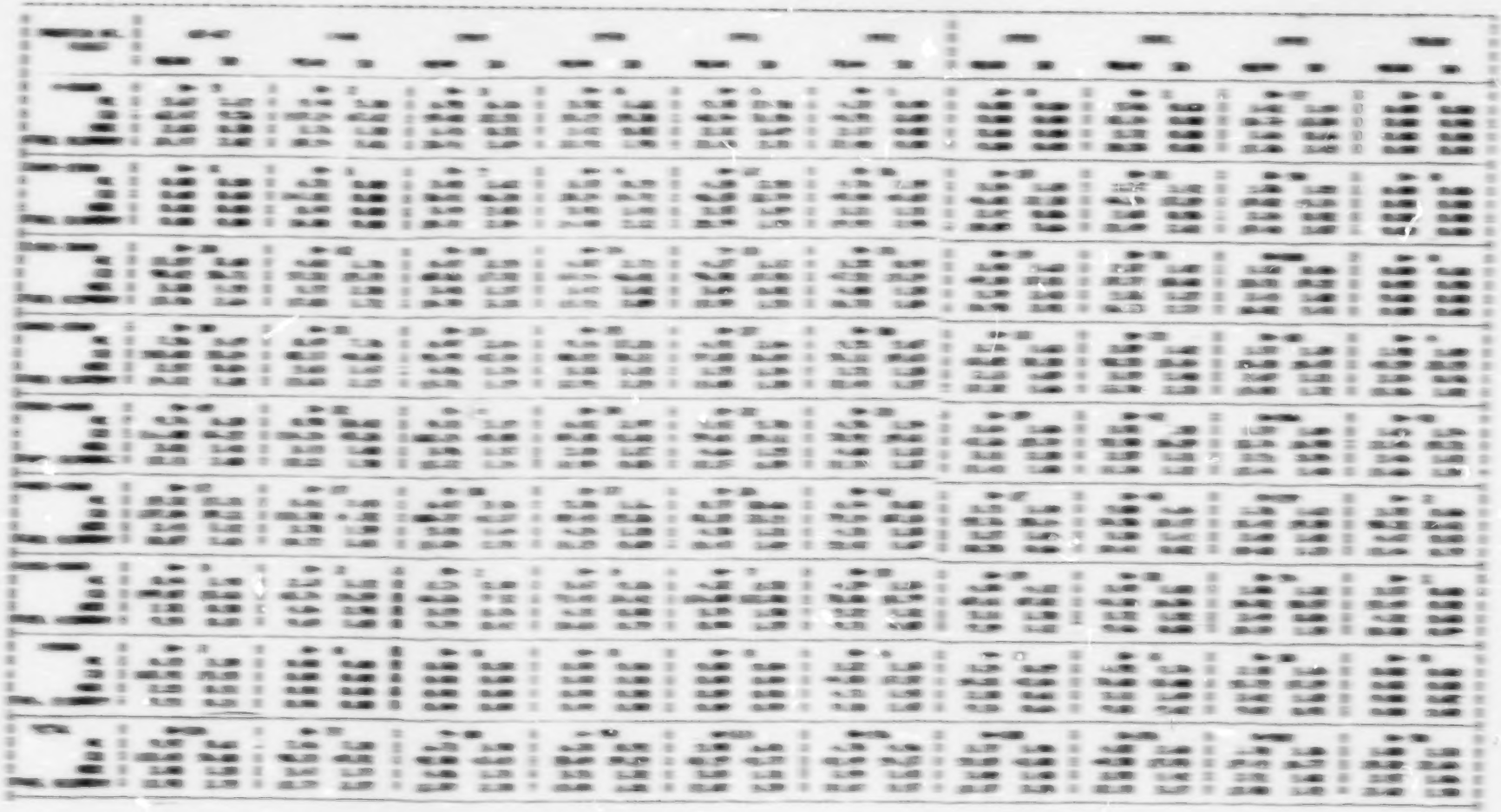


TABLE I-34

FY74 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR CHICAGO

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	98	79.01	937	912	5.86	3.16
1968	80	86.66	865	681	5.92	2.95
1969	85	84.84	693	667	5.76	3.68
1970	40	69.04	664	809	4.86	3.35
1971	48	64.07	458	524	4.27	2.69
1972	51	55.89	316	346	3.44	2.85
1973	61	54.87	355	387	3.21	3.23
1974	55	13.34	263	206	3.14	3.76
1975	168	6.11	117	128	1.46	2.27
75LDT	10	3.15	42	20	0.09	0.16

TABLE I-35

FY74 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR HOUSTON

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	0	0.00	0	0	0.00	0.00
1968	0	0.00	0	0	0.00	0.00
1969	0	0.00	0	0	0.00	0.00
1970	0	0.00	0	0	0.00	0.00
1971	0	0.00	0	0	0.00	0.00
1972	28	67.64	289	270	3.61	3.29
1973	0	0.00	0	0	0.00	0.00
1974	30	24.66	274	302	2.32	2.36
1975	117	9.65	98	117	1.48	2.09
75LDT	10	11.09	105	96	1.13	1.48

TABLE I-36

FY75 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR PHOENIX

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	26	88.16	650	538	3.19	3.40
1968	17	78.16	536	427	3.48	3.80
1969	18	69.97	351	435	0.85	0.87
1970	19	67.06	238	130	3.57	2.49
1971	23	58.75	391	345	3.35	3.19
1972	25	46.95	218	119	3.81	2.79
1973	27	39.97	134	88	2.93	2.53
1974	30	25.26	151	76	2.14	2.30
1975	117	10.25	98	84	1.29	1.96
75LOT	10	8.96	94	93	1.10	1.80

TABLE I-37

FY75 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR ST. LOUIS

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	30	70.86	1039	612	6.11	3.93
1968	30	77.95	783	603	5.00	3.13
1969	35	66.38	842	590	6.44	3.09
1970	40	59.55	776	512	5.37	3.29
1971	45	50.38	675	547	4.79	3.48
1972	50	45.05	652	521	4.02	3.52
1973	90	32.72	619	580	3.81	3.71
1974	50	22.09	467	398	3.38	3.75
1975	150	9.94	171	269	1.57	2.21
75LOT	10	10.20	312	998	0.98	1.69

TABLE I-38

FY75 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR WASHINGTON

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(1K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	0	0.00	0	0	0.00	0.00
1968	0	0.00	0	0	0.00	0.00
1969	0	0.00	0	0	0.00	0.00
1970	0	0.00	0	0	0.00	0.00
1971	0	0.00	0	0	0.00	0.00
1972	25	39.18	636	513	3.27	2.60
1973	0	0.00	0	0	0.00	0.00
1974	30	19.79	283	240	2.51	2.93
1975	35	11.06	117	169	1.13	2.51
TSLOT	10	8.23	72	66	0.40	0.77

TABLE I-39

FY75 EMISSION FACTOR PROGRAM
EMISSION RESULTS FOR ALL CITIES EXCEPT LOS ANGELES AND DENVER

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(1K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	126	80.84	918	681	5.82	3.31
1968	77	69.50	606	602	5.02	3.19
1969	88	62.92	601	566	5.72	3.27
1970	99	59.76	630	551	6.70	3.22
1971	113	48.95	531	137	6.28	3.15
1972	176	41.92	411	403	3.57	2.96
1973	128	29.01	421	476	3.30	3.31
1974	193	20.22	296	309	2.82	3.28
1975	307	8.81	128	170	1.44	2.17
TSLOT	50	8.23	145	201	0.76	1.39

Reproduced from best available copy.

TABLE I-40

FY76 EMISSION FACTOR PROGRAM

EMISSION RESULTS FOR DENVER

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	0	0.00	0	0	0.00	0.00
1968	0	0.00	0	0	0.00	0.00
1969	0	0.00	0	0	0.00	0.00
1970	0	0.00	0	0	0.00	0.00
1971	0	0.00	0	0	0.00	0.00
1972	25	40.91	588	680	5.49	6.88
1973	27	32.80	237	196	3.90	5.19
1974	30	24.63	230	219	3.61	5.67
1975	38	13.93	110	107	1.61	2.18
75LOT	10	14.10	99	105	1.29	2.17

TABLE I-41

FY76 EMISSION FACTOR PROGRAM

EMISSION RESULTS FOR LOS ANGELES

IDLE HC AND IDLE CO TEST RESULTS

MODEL YEAR	N	MEAN MILES(K)	IDLE HC MEAN	IDLE HC SD	IDLE CO MEAN	IDLE CO SD
65-67	0	0.00	0	0	0.00	0.00
1968	0	0.00	0	0	0.00	0.00
1969	0	0.00	0	0	0.00	0.00
1970	0	0.00	0	0	0.00	0.00
1971	0	0.00	0	0	0.00	0.00
1972	25	49.59	99	97	1.74	1.61
1973	27	32.76	147	180	1.75	1.72
1974	30	22.62	78	104	1.44	1.62
1975	38	8.13	33	43	0.14	0.44
75LOT	10	9.24	39	49	0.60	1.13

APPENDIX II

PERCENT RESPONSES TO QUESTIONNAIRE

3. Did you buy the vehicle new or used?

New	75.7
Used	24.3

4. How long ago did you purchase the vehicle?

0-3 months	9.4
3-12 months	35.0
1-2 years	17.6
Over 2 years	38.1

5. On a yearly basis, how many miles is this vehicle driven?

0-5000	9.3
5-10000	35.4
10-15000	33.9
15-20000	14.5
20-30000	5.3
Over 30000	1.9

6. Where is the driving done?

	All	Most	Some	None
Downtown Driving	12.3	38.5	45.4	23.7
Suburban Driving	4.4	46.6	39.5	9.5
Expressway Driving	1.8	19.6	64.9	13.7

7. For what purpose?

	All	Most	Some	None
To and from work	12.3	38.5	45.4	24.0
Shopping	8.9	19.0	53.3	18.7
Business	3.6	8.7	23.3	64.3
Other	6.6	11.4	37.3	44.8

6. Would you consider that the vehicle has been maintained to the manufacturers specifications?

Yes	87.5
No	3.1
Don't know	9.4

7. How long ago was the last oil change?

0-6 mo.	88.4
6-12 mo.	6.5
Over 1 year	0.2
Don't know	4.9

8. How long ago was the last engine tune-up?

0-6 mo.	64.8
6-12 mo.	21.7
Over 1 year	5.1
Don't know	8.3

9. Who performed this tune-up?

Dealer	42.9
Independent garage	36.5
Tune-up clinic	2.6
Yourself or friend	18.6
Don't know	9.4

10. Has the vehicle or engine been altered by the installation of exhaust headers, modified exhaust system components, or performance carburetor components, camshaft, or ignition equipment?

Yes	2.2
No	89.7
Don't know	8.1

11. Has the vehicle been operated 50 percent of the time on improved roads, in competitive events, or in hauling or transporting loads heavier than for which it was designed?

Yes	0.8
No	97.3
Don't know	1.9

12. Has this vehicle ever had major damage in any of the following areas? (check one or more.)

	Yes	No
Cooling System	2.1	97.9
Engine	2.0	98.0
Fuel Tank	1.1	98.9
Exhaust System	1.5	98.5
No Damage	94.5	5.5

13. If the vehicle requires unleaded fuel, has it been operated on leaded fuel?

Not Required	55.5
Never	31.1
Once or twice	1.6
Occasionally	1.6
Regularly	4.8
Don't know	5.4

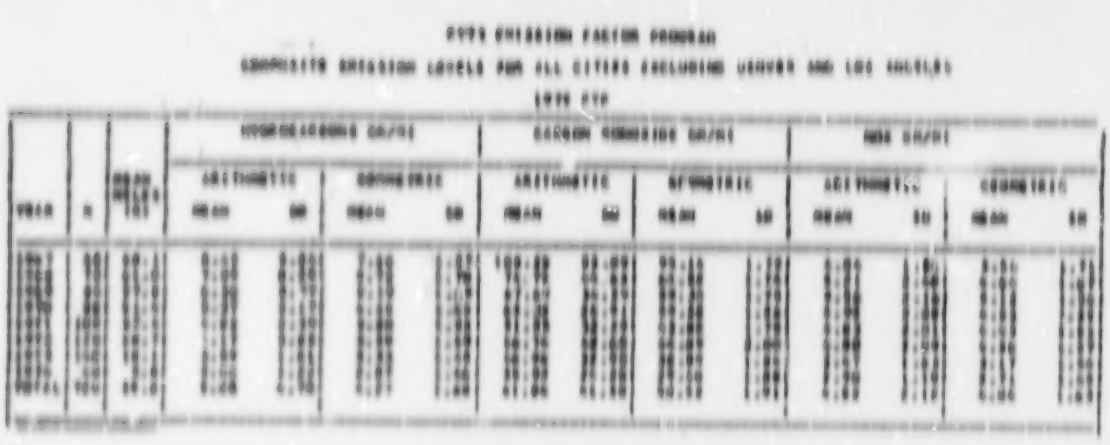
14. Have you or others noticed a hydrogen sulfide (rotten eggs) odor in this vehicles exhaust?

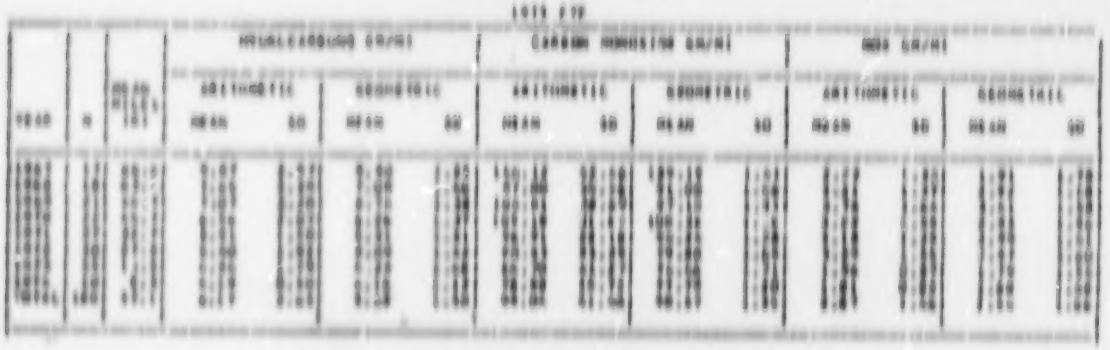
Never	78.1
Rarely	2.0
Occasionally	5.2
Regularly	3.3
Don't know	11.4

APPENDIX III

SUMMARY OF RESULTS FROM FY 71, FY 72, AND FY 73 EMISSION FACTOR PROGRAMS

TABLE III-1





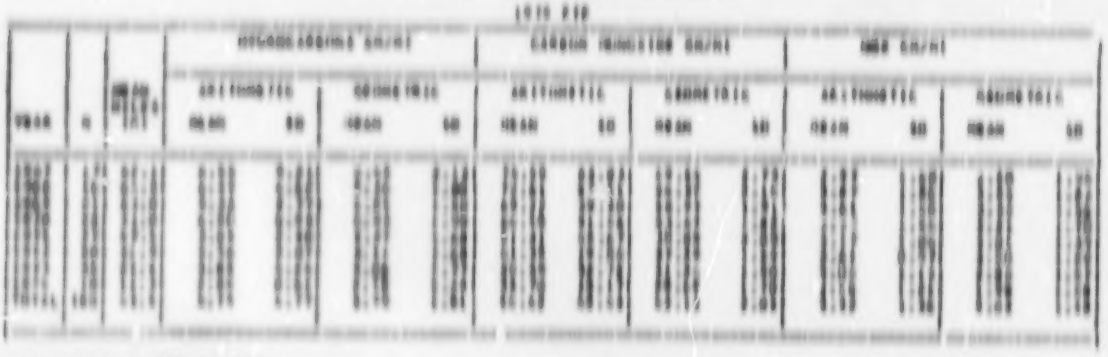


TABLE III-2

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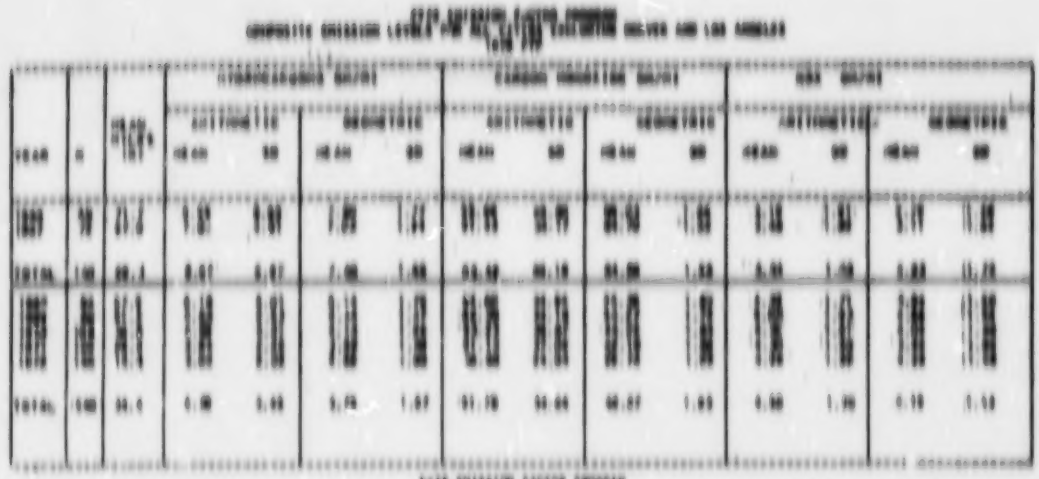
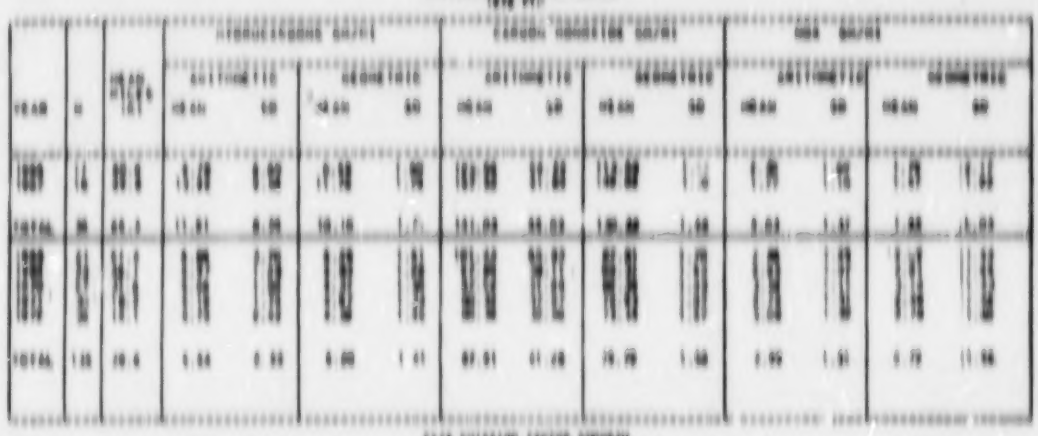
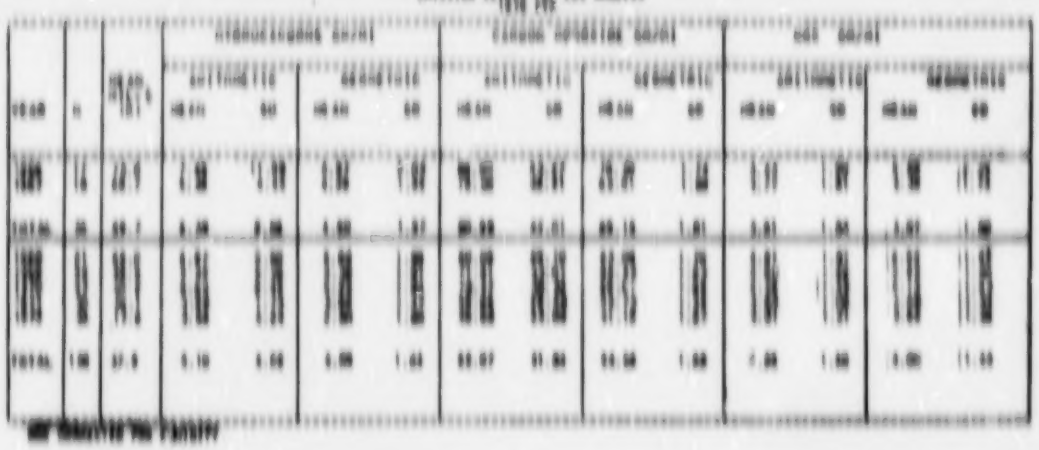
TABLE III-3







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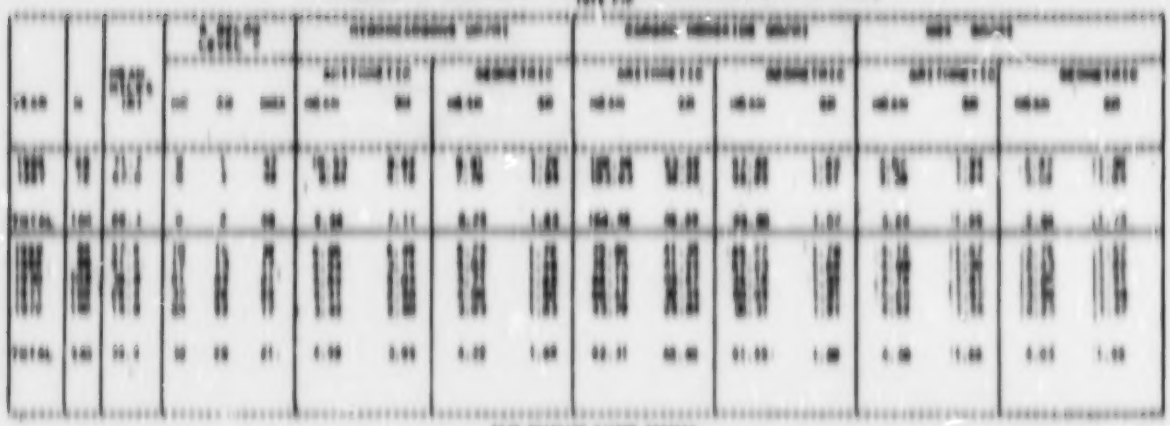

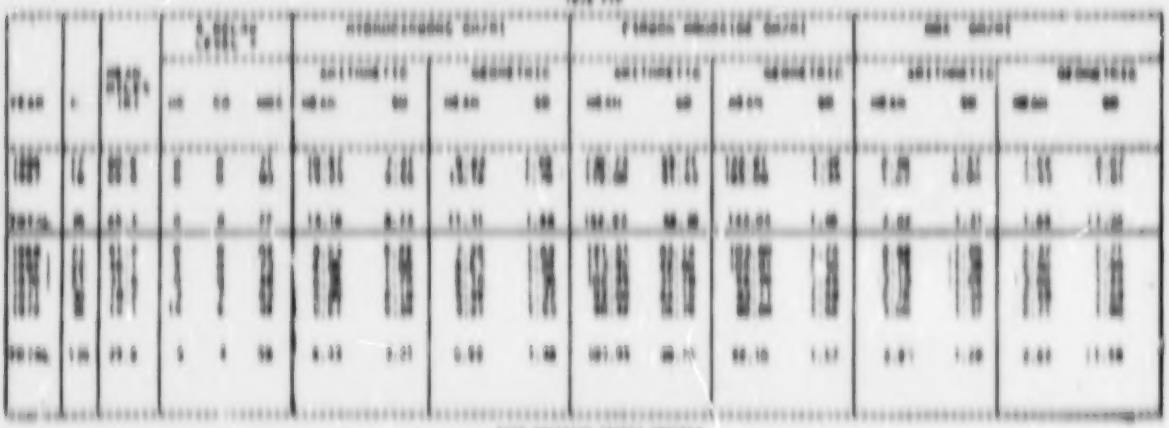

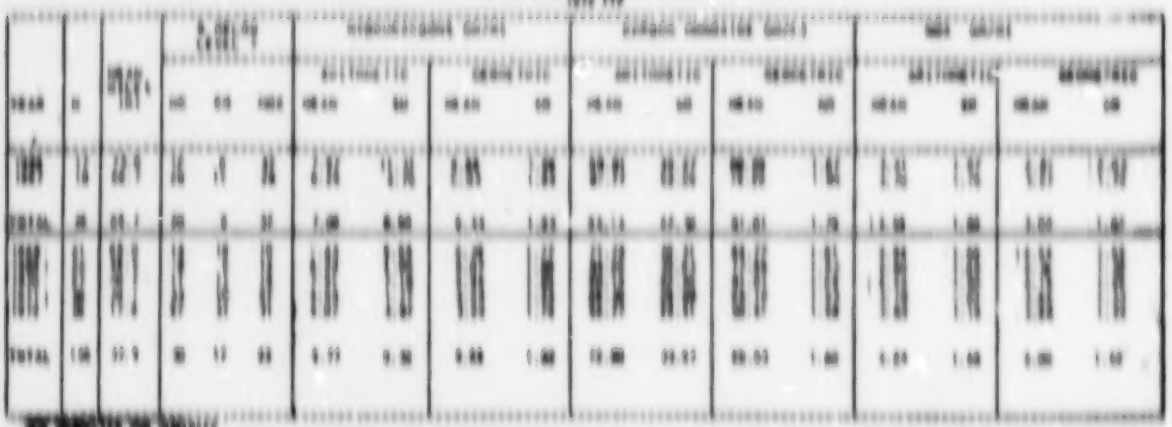

TABLE III-5

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